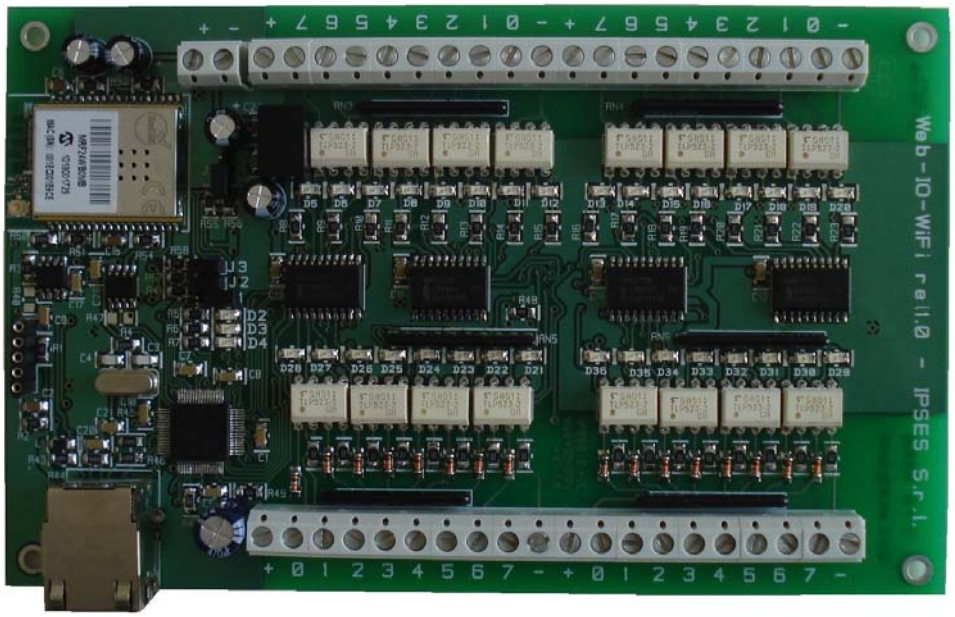
WEB-IO-WiFi Control Unit
USER MANUAL

Rel. 01.00.0002

(Hardware code: WEB-IO-WiFi)



CONCEIVING
PLANNING
DEVELOPMENT
IN SCIENTIFIC
ELECTRONICS

This manual in English is the original version.

Printed in Italy

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

GUARANTEE

IPSES warrants to the end-user in accordance with the following provisions that its branded hardware products, purchased by the end-user from IPSES company or an authorized IPSES distributor will be free from defects in materials, workmanship and design affecting normal use, for a period of one year as of the original purchase date. Products for which proper claims are made will, at IPSES's option, be repaired or replaced at IPSES's expense[1].

Exclusions

This Guarantee does not apply to defects resulting from: improper or inadequate installation, use or maintenance; actions or modifications by unauthorized third parties or the end-user; accidental or wilful damage or normal wear and tear.

Making a claim

Claims must be made by contacting IPSES office within the guarantee period.
Please, contact:

IPSES S.r.l. - Via Suor Lazzarotto, 10 - 20020 Cesate (MI) Italy
Tel. (+39) 02 39449519 – (+39) 02 320629547
Fax (+39) 02 700403170
http://www.ipses.com - e-mail: support@ipses.com

Limitation and Statutory Rights

IPSES makes no other warranty, guarantee or like statement other than as explicitly stated above and this Guarantee is given in place of all other guarantees whatsoever, to the fullest extent permitted by law. In the absence of applicable legislation, this Guarantee will be the end-user's sole and exclusive remedy against IPSES.

General Provisions

IPSES makes no express warranties or conditions beyond those stated in this warranty statement. IPSES disclaims all other warranties and conditions, express or implied, including without limitation implied warranties and conditions of merchantability and fitness for a particular purpose.
IPSES's responsibility for malfunctions and defects in hardware is limited to repair and replacement as set forth in this warranty statement.
IPSES does not accept liability beyond the remedies set forth in this warranty statement or liability for incidental or consequential damages, including without limitation any liability for products not being available for use or for lost data or software.

[1] With the exclusion of shipping costs for and from IPSES's development office.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

WARNING!
ELECTRICAL DEVICES COULD DAMAGE EQUIPMENT OR PROPERTY OR CAUSE PERSONAL INJURY

This guide contains instructions and technical features of the WEB-IO-WiFi Control Unit.
Read with attention before attempting to install.
It is the responsibility of the technician to undertake all the safety rules provided by the law during the installation and the use of this device.
For any information which is not contained in this guide, please contact:

IPSES S.r.l. - Via Suor Lazzarotto, 10 - 20020 Cesate (MI) Italy
Tel. (+39) 02 39449519 – (+39) 02 320629547
Fax (+39) 02 700403170
http://www.ipses.com - e-mail: support@ipses.com

TABLE OF CONTENTS

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

REVISION HISTORY

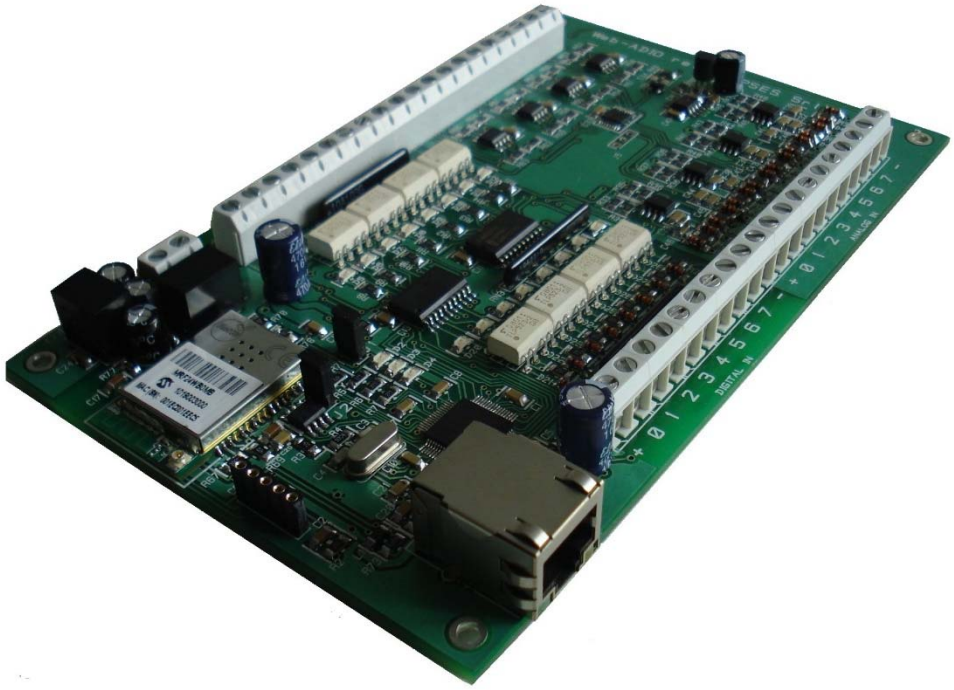
Manual revision history

Revision/ Date	Change description	Author
01.00.0000 December, 2010	First version Released	Rivolta A.
01.00.0001 June, 2015	Update document layout	Bottaccioli M.
01.00.0002 August, 2016	Added ISO 9001:20015 logo	Bottaccioli M.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

GENERAL FEATURES

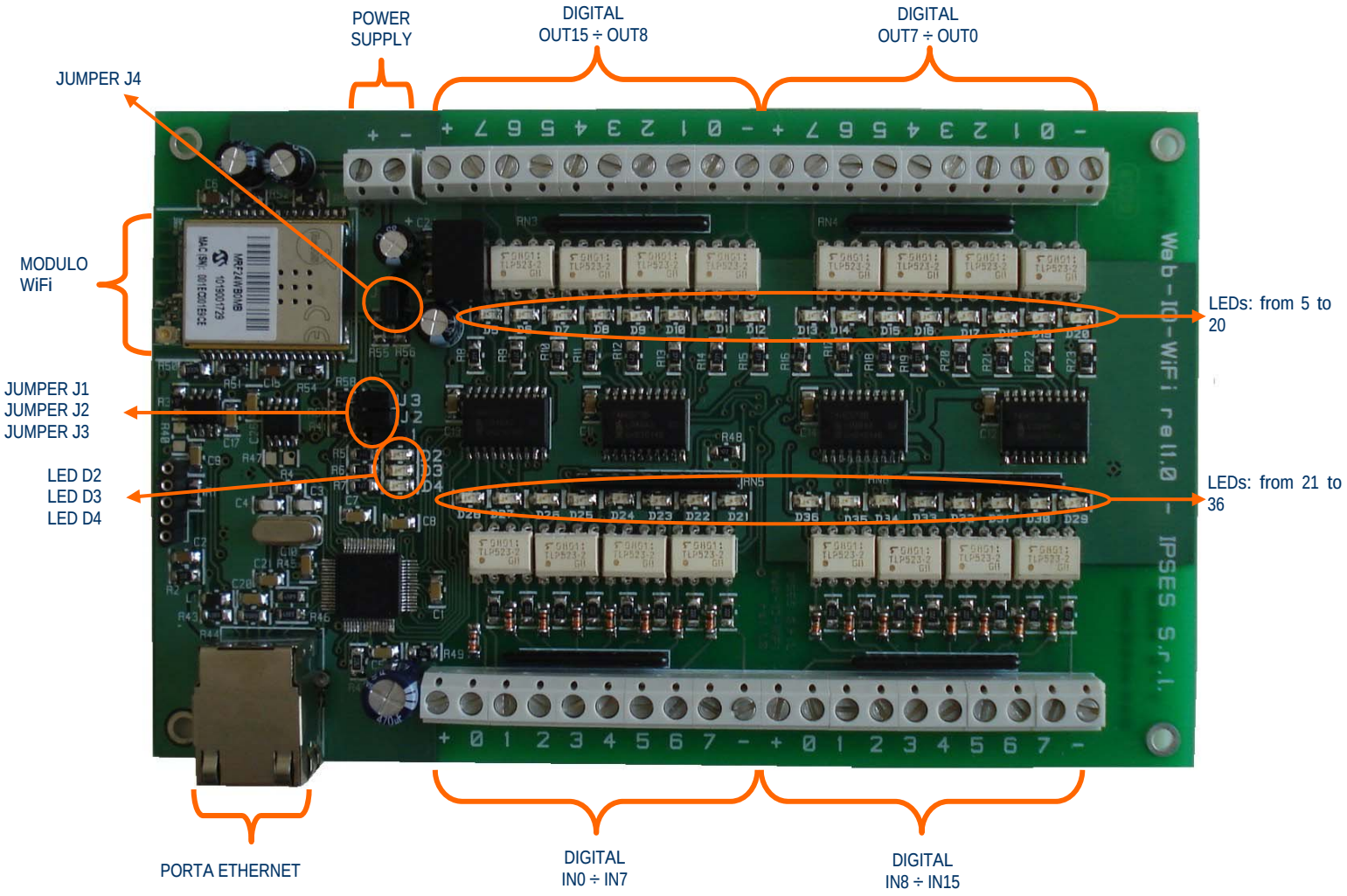
WEB-IO-WiFi is a control unit integrated on a *European Card* Format (160 x 100 mm – 6,30 x 3,94 inches) equipped with Ethernet and WiFi interfaces.
The card needs an external power supply (from 5V to 32V, continuous current) to operate.
WEB-IO-WiFi can acquire sixteen optocoupled inputs and drive sixteen optocoupled outputs. Both are reciprocally isolated intwo groups of eight.
The communication with the card can be supplied with either the Ethernet interface (cabled) or the Wi-Fi 802.11b interface (wireless). The control and the configuration of the device are achieved thanks to an *http* browser or a MIB browser, or a *telnet* client, or using the demo software provided with.
User can set the status of each output at the power-up: this status will be saved in a non volatile memory.
The card allows to perform a firmware upgrade directly from web page, without needs any external hardware or software component.



IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

CARD DESCRIPTION

WEB-ADIO-WiFi card is shown in the picture below: in the upper part of the card the digital and analogical outputs are divided in two groups of eight (numbered from 0 up to 7 on the card serigraphy), and, similarly, in the lower part of the card there are the digital and analogical inputs (numbered and divided in the same way).



Picture 1: WEB-IO-WiFi card

Description of the LEDs:

D2	Green LED: Status LED (see relevant paragraph)
D3	Green LED: Status LED (see relevant paragraph)
D4	Red LED: Status LED (see relevant paragraph)
D5	Red LED: digital OUT 15 activated
D6	Red LED: digital OUT 14 activated
D7	Red LED: digital OUT 13 activated
D8	Red LED: digital OUT 12 activated

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

D9	Red LED: digital OUT 11 activated
D10	Red LED: digital OUT 10 activated
D11	Red LED: digital OUT 9 activated
D12	Red LED: digital OUT 8 activated
D13	Red LED: digital OUT 7 activated
D14	Red LED: digital OUT 6 activated
D15	Red LED: digital OUT 5 activated
D16	Red LED: digital OUT 4 activated
D17	Red LED: digital OUT 3 activated
D18	Red LED: digital OUT 2 activated
D19	Red LED: digital OUT 1 activated
D20	Red LED: digital OUT 0 activated
D21	Green LED: V_{high} applied at digital IN 7
D22	Green LED: V_{high} applied at digital IN 6
D23	Green LED: V_{high} applied at digital IN 5
D24	Green LED: V_{high} applied at digital IN 4
D25	Green LED: V_{high} applied at digital IN 3
D26	Green LED: V_{high} applied at digital IN 2
D27	Green LED: V_{high} applied at digital IN 1
D28	Green LED: V_{high} applied at digital IN 0
D29	Green LED: V_{high} applied at digital IN 15
D30	Green LED: V_{high} applied at digital IN 14
D31	Green LED: V_{high} applied at digital IN 13
D32	Green LED: V_{high} applied at digital IN 12
D33	Green LED: V_{high} applied at digital IN 11
D34	Green LED: V_{high} applied at digital IN 10
D35	Green LED: V_{high} applied at digital IN 9
D36	Green LED: V_{high} applied at digital IN 8

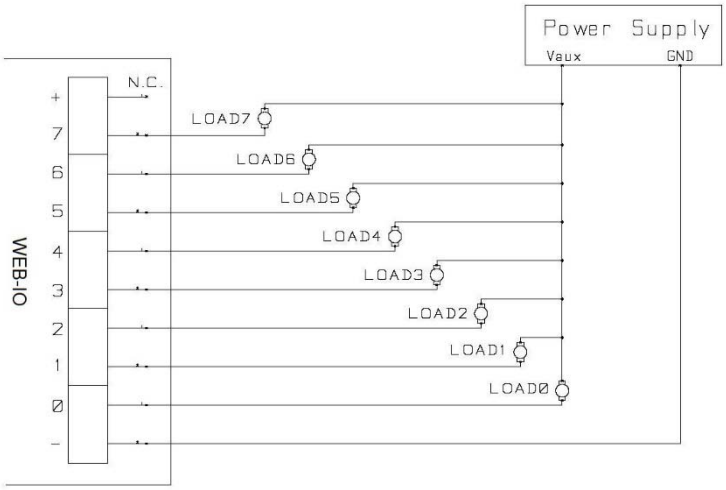
Description of the jumper:

J1	Reset of settings with factory parameters restoration if jumper is insert before the power-up.
J2	Address Configuration mode if jumper is inserted during Operative mode. For more information to this case, see paragraph "ADDRESSES CONFIGURATION".
J3	Available for further use.
J4	Jumper to select the network interface: if the jumper is inserted the Ethernet interface (RJ45 connector) is active, else the wireless interface is active (WiFi module). To enable the network interface change, the user must shutdown and repower the card.

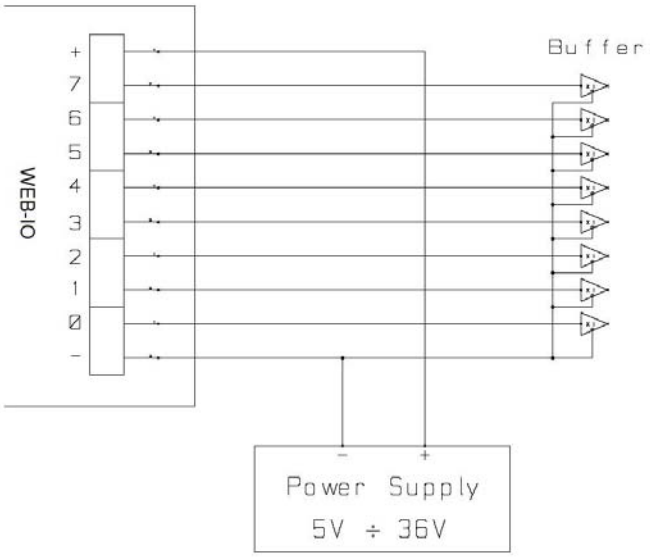
IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

OUTPUTS

The sixteen outputs are completely isolated, both between them in two groups of eight and with other signals on the device. Here below there are the diagrams of two typical connections of external device to WEB-IO-WiFi card: in the first case (Picture 2a), the card will manage directly some loads (with maximal current of 150mA). In the second case (Picture 2b), the card is connected to a high impedance device (i.e. the inputs of a PLC).



Picture 2a: diagram of the digital output connections: directly managing of loads



Picture 2b: diagram of the digital output connections: connection to a high impedance device

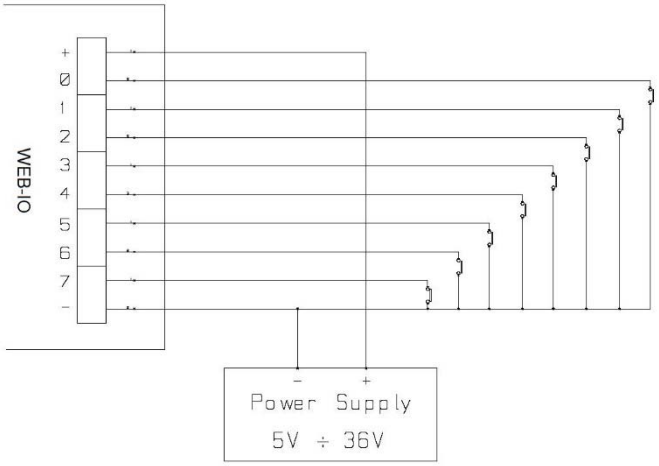
Output status is displayed by LEDs placed near every connector (LED from D5 to D20, showed in Picture 1).

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

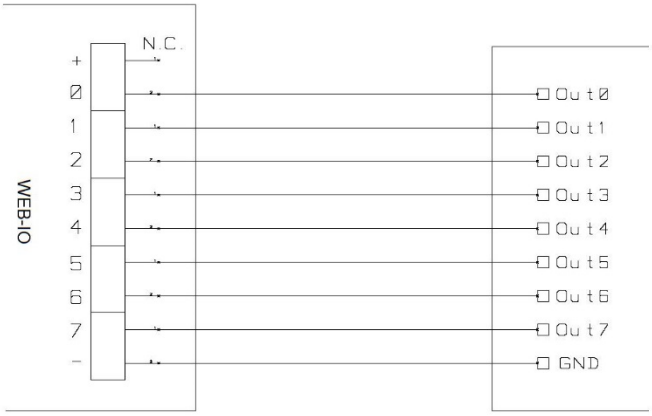
INPUTS

The sixteen inputs are completely isolated, both between them in two groups of eight and with other signals on the device.

We suggest to connect inputs following one of the two diagrams displayed below:
-Picture 3a: use this way in case inputs have to detect the pressure from a switch or an open collector output.
-Picture 3b: use this way in case inputs are directly controlled by a voltage.



Picture 3a: diagram of input implementation: detection of the pressure from a switch or an open collector output



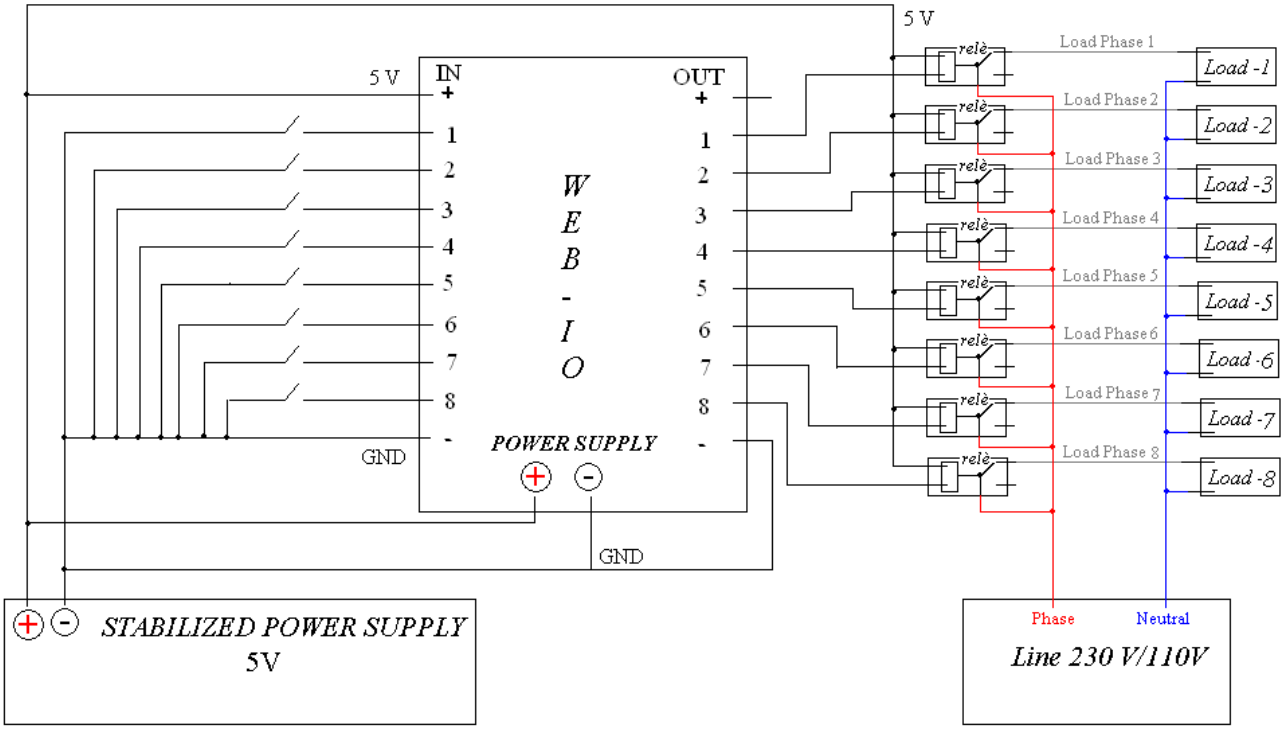
Picture 3b: diagram of input implementation: inputs directly controlled by a voltage

Input status is displayed by LEDs placed near every connector (LED form D21 to D36, showed in Picture 1).

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

EXAMPLE OF USAGE

The follow example, in Picture 4, shows how you can connect the digital channels of the WEB-IO-WiFi for manage an external load with line supply.



Picture 4: external load with line supply management

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

FUNCTIONING MODES

The firmware of the board implements two different modes, as specified in the following table.

Mode	Descrizione
Operative	This is the normal mode. During this status, the control of the outputs and PLC and Timeout functions are fully available. The interaction with the board can made by web browser, MIB browser, client telnet, or demo software.
Bootloader	Using this mode, the board waits for a firmware upgrade or a return to Operative mode. In this state all the outputs and PLC and Timeout function are disabled. The interaction with the board can only made by a web browser.

The jumper J4 allows to select the physical interface for the network communication (cabled or wireless) before the power-up of the board, but only in Operative mode.
In Bootloader mode the card can use only the Ethernet interface (cabled) without regarding the status of jumper J4.

LED STATUS

The LEDs D2, D3 and D4 indicate the status of the system.
In *Operative* mode the LED configuration is the following one:

LED D2	LED D3	LED D4	Status Description
Off	Off	Blinking	Device operative and configured with Ethernet interface. The network cable is not detected.
On	Off	Blinking	Device operative and configured with Ethernet interface. The network cable is detected.
Off	On	Blinking	Device operative and configured with wireless interface. No connection with any AP.
On	On	Blinking	Device operative and configured with wireless interface. Connected to the AP.
/	/	Static	System critical error. It is necessary to reboot the board.
Blinking	Blinking	/	Hardware resetting to factory settings or software TCP/IP address configuration
On	Blinking	/	*telnet* password modifying

In *Bootloader* mode the LEDs D2, D3 and D4 light up repetitively in sequence, until one remains in this state.
In Operative mode, with wireless interface active, if LED D4 crashes in a static status (on/off) more than 5 seconds means that a critical error occurred and the module need to be rebooted.

POWER SUPPLY

The board is equipped with a connector (see next Picture: the connector labeled as "VIN") which allows to connect an external voltage supply to power the board: its value must be included from +5V_{DC} up to +32V_{DC}.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

The voltage supply can be used also as "*Power Supply*", as indicated in Picture 2b and 3a: by these way, the galvanic isolation of the board between I/O and control logic will be lost, so the GNDs must be connected together to avoid irreversible damage of the card.

WARNING!
The maximum supply voltage must not exceed +32V_{DC}: in case of use of higher voltage the components of the board may damage irremediably.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

NETWORK INTREFACES – MAC ADDRESSES

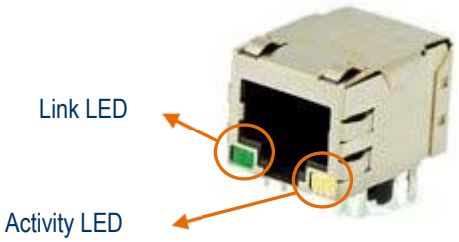
The WEB-IO-WiFi board is equipped with two separate and independent physical network interfaces: a cabled interface (connector RJ45) and a wireless interface (WiFi module). These physical layer cannot work simultaneously (they are mutually exclusive) and their selection is made by jumper J4, during system start-up.

J1 status	Physical interface
Closed	Cabled
Open	Wireless

A univocal MAC Address is defined for each physical interface: one for the cabled one (Cabled MAC Address) and one for the wireless one (Wireless MAC Address).
The MAC Address shown on the http pages or requested from telnet or SNMP commands is relative to the active physical interface.
The Test Report of each board shows the MAC Address for both interfaces.

ETHERNET MODULE

The physical layer of the Ethernet network protocol supports the 10Base-T standard and it is fully compliant with the 10/100/1000Base-T standard. The WEB-IO-WiFi can be connected to any commercial router or switch without problems.
The physical connection between the card and the network cable is made by the RJ45 connector, as shown in the following picture:



Picture 5: RJ45 Ethernet connector

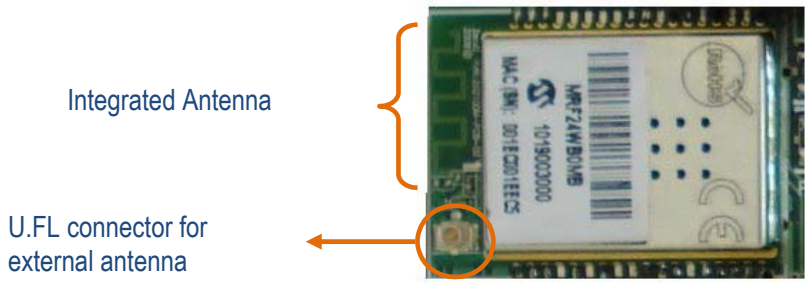
The green LED (*Link* LED) indicates the detection of the Ethernet network, the yellow LED (*Activity* LED) is on during the communication packets Tx/Rx activity.
When the board runs with the wireless interface active, the LEDs of the RJ45 are always off, also if a network cable is plugged-in. To switch to the Ethernet interface, insert jumper J4 before power-up the board.

WiFi MODULE

The WiFi module supports the IEEE 802.11b standard and is certified *Wi-Fi® compliant.* Thanks to this module is possible to control the board through an *Access Point* that supports this standard.
The WiFi module is available in two version: with integrated antenna (WEB-IO-WiFi), and with a miniaturized coaxial connector to allows to connect an external antenna (WEB-IO-WiFi-U.FL).

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

For application in which the card need to be enveloped into metallic box, we suggest to use the -U.FL module to avoid signal degradation due to the chassis.



Picture 6: WiFi module

To establish a connection with an Access Point (AP) is necessary to know its SSID, authentication type and network key values.
The WiFi module accepts only Service Set Identifier (SSID) made by string from 2 to 32 of printable alphanumeric chars, without spaces.
The authentication method supported are described in the following table:

Authentication	Description
Open	The AP does not require any network key to connect
WEP	The AP requires a 5 chars key (WEP-40bit) or a 13 chars key (WEP-104bit) in ASCII or hexadecimal format.
WPA/WPA2 (Personal)	The AP requires a key made by 8 to 64 chars, in ASCII or hexadecimal format.

If the authentication type is WEP or WPA/WPA2, it is necessary to define a valid key, respect to the codifying method selected. Both SSID and key are case-sensitive.
The modifying of previous parameters is possible only from http pages: to improve a greater security the telnet service allows only their reading.

At every power-up the WiFi module calculate the security key before to connect with the AP: this process can require up to about 30 seconds, depends on authentication method implemented.

Some Access Points allow to join their network only to devices which MAC Address is included into a list of physical addresses allowed. If your AP has this option active, include the Wireless MAC Address of your card into the list: for more information refer to the user manual of your AP.

CERTIFICATIONS AND REGIONAL DOMAINS

The WiFi module is able to work in the most common regional domains (Regulatory Domains), as defined by the *ANSI/IEEE Std 802.11, 1999 Edition* standard and subsequent integrations. The following table shows the list of the domain, with relative regions and channels:

Regulatory Agency	Regions	Channels
FCC	USA, Mexico	1-11

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

IC	Canada	1-11
ETSI	Europe	1-13
ARIB	Japan (only ch.14)	14
ARIB	Japan (ch.1-13)	1-13

The European normative include also Spain and France regions, that in the past became available only channels 10-11 and 10-13, respectively.
For South America regions must be adopted one of the indicated domains, relative to the regulations of the State where the system is: it is care of the user to comply with this.
The domain can be modified in the *http TCP/IP Configuration* page, as described in the *Server http* paragraph.
To keep valid certifications for own country it is mandatory to set correctly this field.

The following table shows the center band frequency associated to each channel:

Channel	Center Frequency (GHz)
1	2.412
2	2.417
3	2.422
4	2.427
5	2.432
6	2.437
7	2.442
8	2.447
9	2.452
10	2.457
11	2.462
12	2.467
13	2.472
14	2.484

The WiFi module has achieved the necessary approvals for radio emissions in the following regions:

- United States (FCC)
- Canada (IC)
- Europe (ETSI)
- Japan (ARIB)

Moreover, it has achieved the Wi-Fi® Alliance certification (WFA ID: WFA7150).

NETWORK SERVICES

WEB-IO-WiFi board hosts a server for ***http*** service, a server for ***telnet*** service and a server for SNMP (Simple Network Management Protocol) service. Data transfer is based on a TCP/IP protocol: the protocol configuration parameters can be modified only from *http* service or the "TCP/IP ADDRESS CONFIGURATOR SOFTWARE" described in a later paragraph. To validate these changes a password named *http* service password is required.
Similarly, to access *telnet* service an authentication password named *telnet* service password is required.
Both passwords are case-sensitive alphanumerical strings with a valid length included between 1 and 8 characters. The default value for both is "ipses" and it can be modified only from the relevant service.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

The SNMP service supports both V1 and V2c versions. The last one implements a community-based service access, which is an authentication access method. It is possible to set up to 3 different communities both for read and write operations.
The default communities are:

- *Write Community* ("***private***", "***write***", "***public***")
- *Read Community* ("***public***", "***read***", "").

Each specified community can be 8 chars maximum length; if none community is specified, the access to the pertinent service (read and/or write) is blocked.

ADDRESSES CONFIGURATION

The following table shows the default configuration parameter of each board:

Parameter	Value
Hostname (NetBIOS)	WEBIOWIFI
IP address	192.168.0.16
Subnet mask	255.255.255.0
Gateway address	192.168.0.4
Primary DNS	193.70.152.15
Secondary DNS	0.0.0.0
http password	ipses
telnet password	ipses
SSID (Access Point)	WEB-AP
Authentication	WEP-104bit
Key	www.ipses.com
Regulatory Domain	ETSI (Europe)
Startup status outputs	all OFF

The addresses for Primary DNS server and Secondary DNS server must be modified according to the addresses assigned from the network's provider where you connect your board. For more information contact your network provider.

It is possible to restore factory parameters following this procedure:

- disconnect power supply from the board
- insert jumper J1 (see Picture 1 at page 8)
- connect power supply to the board

If the procedure is successfully completed, LEDs D2 and D3 will flash alternatively for about 3 seconds. At this point it will be possible to remove jumper J1 form the board.

If TCP/IP parameters of the network are not compatible with default board parameters, or if the IP address is already assigned to another device, you can reconfigure them choosing between the following two procedures:

- Manual configuration procedure
  - connect the board locally and directly to a PC equipped with a network card (without connect it to any network).
  - verify that in the *Property* items under *Local Network Connection Status (LAN)* window located in *Control Panel » Network Connection Properties* path the IP address of your PC is 192.168.0.1 and their Subnet Mask is 255.255.255.0. Otherwise set these values in their respective fields.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

- power on the board and access to *http* service typing in the URL browser the current board address (by default http://192.168.0.16/).
- go to the *TCP/IP Configuration* page, then set the new parameters and save them. Verify Save & Reboot operation works successfully.
- install the card in the network and access it with new parameters.

❖ Software configuration procedure

- with the board already powered on, insert the jumper J2.
- Run the address configurator software "WEB-IO-WiFi Address Configurator.exe" included in the installer CD provided with the board, and follow the steps described in the paragraph "TCP/IP ADDRESS CONFIGURATION SOFTWARE".
- at the end of the configuration, remove jumper J2.

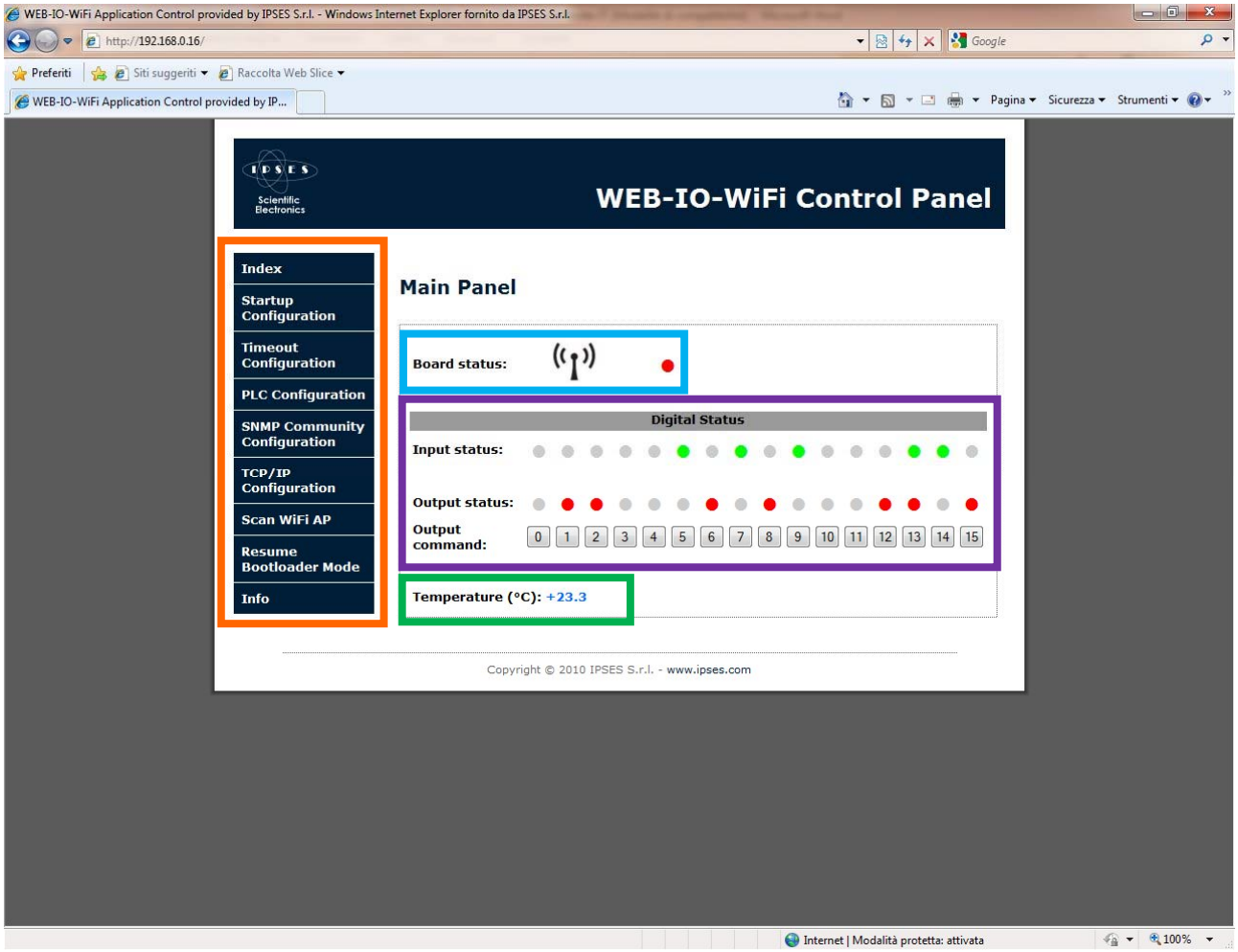
IMPORTANT: do not disconnect the power supply during the address configuration procedure: a supply reset restore factory parameters.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

http SERVER

The *http* server implemented on the board allows to manage up to 5 simultaneous sessions.
To access the server, open a web browser and type the board IP address http://192.168.0.16/ in the URL field: you will be redirect to the main page, *index.htm*, as shown in Picture 7.
The implemented server was tested and was resulted fully compliant with the following browser:

- Microsoft Internet Explorer 8.0.7600.16385
- Mozzilla Firefox 3.6.12
- Google Chrome 7.0.517.44
- Apple Safari 5.0.3 (7533.19.4)

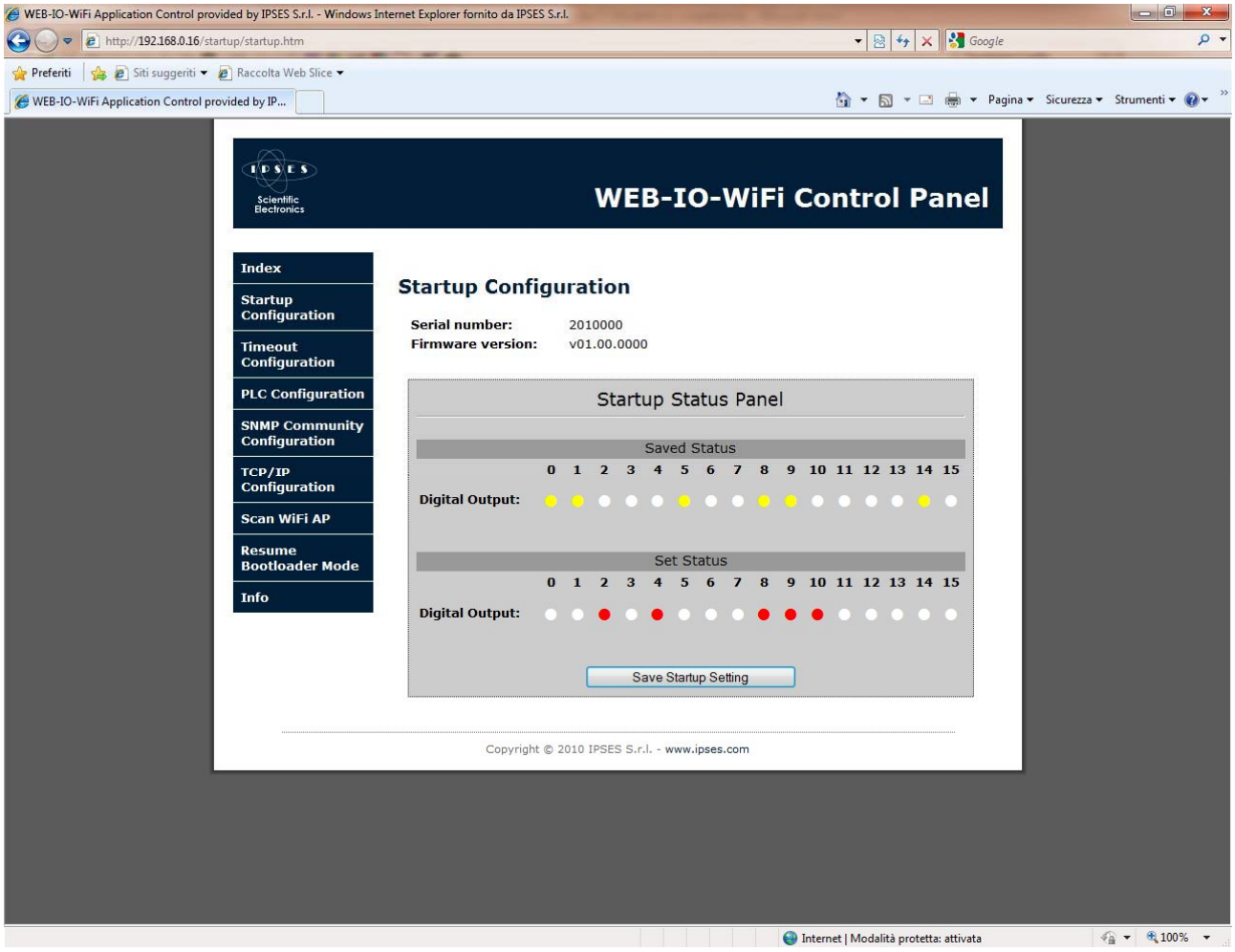


Picture 7: *http* server index page.

On the left side of the WEB-IO-WiFi control panel there is the menu (surrounded in orange in Picture 7) which allows to access the pages implemented on the *http* server.
Board status (surrounded in blue) shows the network interface active on the board by an image (a stylized antenna or a cable), and D4 status LED mounted on the card.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

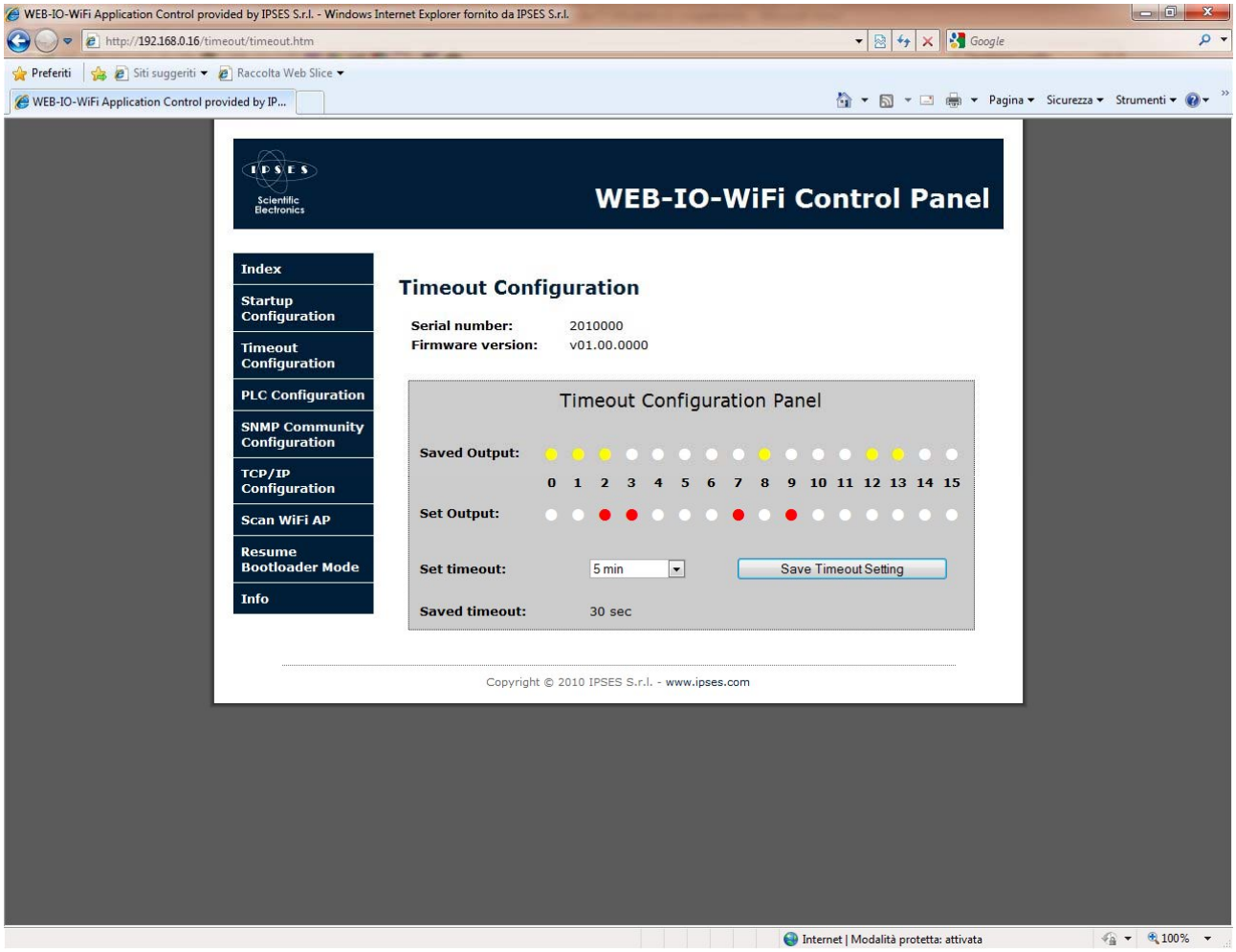
The section related to the I/O is surrounded in violet. *Input status* and *Output status* fields report respectively the current status of each inputs and outputs of the board. *Output command* buttons, labeled from 0 to 7, drive the outputs: each button pressure set or reset the relative output.
The filling colors used in the *http* page are correspondent to the LEDs mounted on the card.
Temperature field, surrounded in green, shows the measured temperature by the sensor; if the board is not equipped with the temperature sensor, a message is displayed.
If the communication is lost the current page shows the following error message: "*Connection to WEB-IO-WiFi board was lost".*



Picture 8: Startup configuration page.

Startup Configuration page, shown above in Picture 8, allows to read identification board parameters (like *Serial Number* and *Firmware Version*), and to set the startup outputs status through the *Startup Status Panel* form. *Saved status* field displays the actual startup configuration stored in memory: yellow LEDs indicate outputs of which configuration is already saved. Clicking on LEDs of *Set status* field it is possible to set the new startup configuration which will be stored only after the pressure of *Save Startup Settings* button.

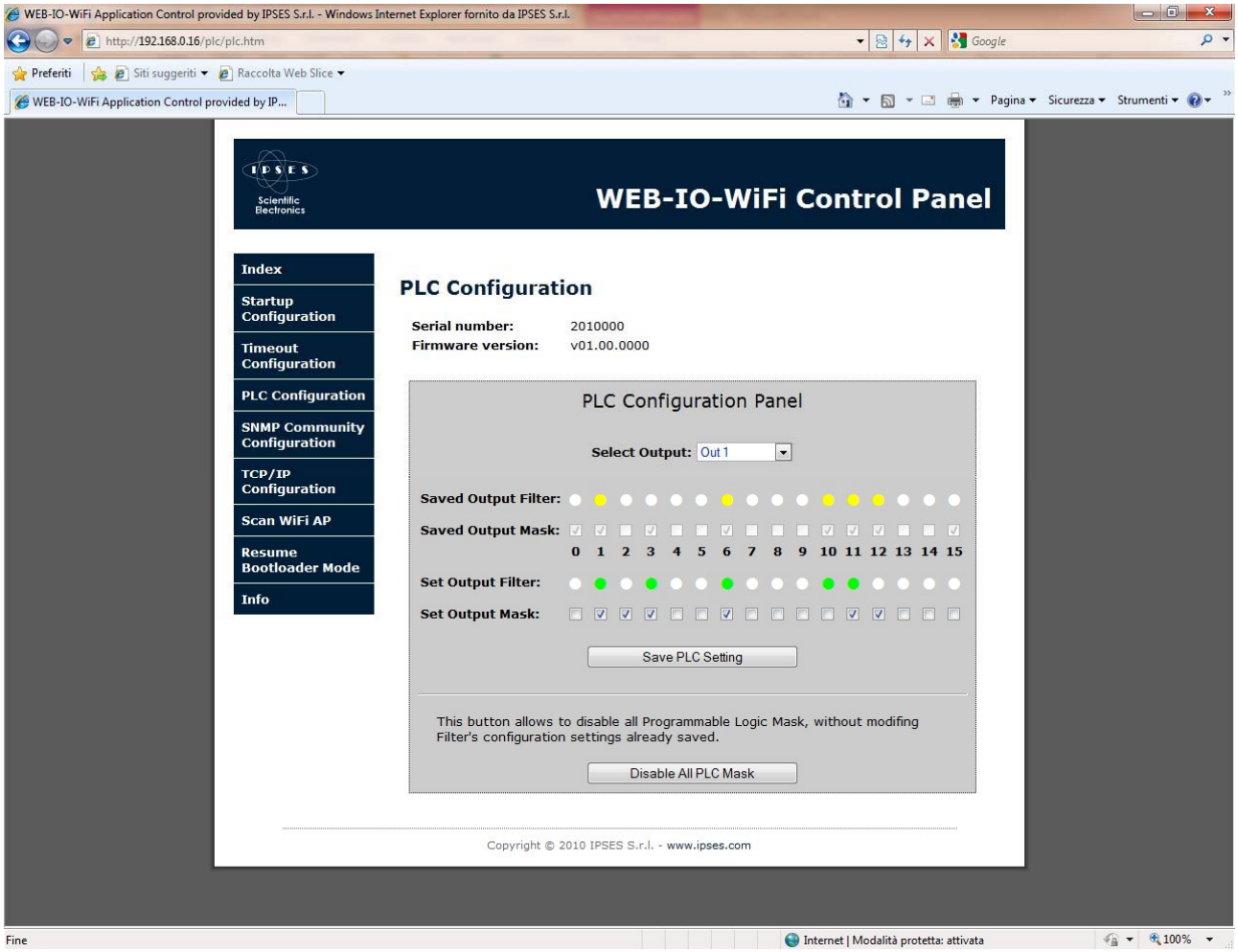
IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com



Picture 9: Timeout parameters configuration page.

Timeout Configuration page, shown in Picture 9, allows to read and to set the parameters of the Timeout function. *Saved Output* field display the status of the outputs if the *Saved timeout* field time elapses with no commands or requests received by the board.
Clicking on LEDs of *Set status* field it is possible to set new outputs configuration, while *Set timeout* field allows to select the new timeout time among the following items: "*No timeout*", *"5sec", "10sec", "30sec", "1min", "5min", "10min", "30min", "1hour*". "*No timeout*" item disables the Timeout function on the board. The *Save Timeout Setting* button stores the new settings on the memory of the board.
The Timeout function has priority over PLC function, described next. When the Timeout function occurs, the outputs will be sets as configured and remain in this status, while any active PLC logic will be temporarily disabled, until the board will not receive a new command or request.

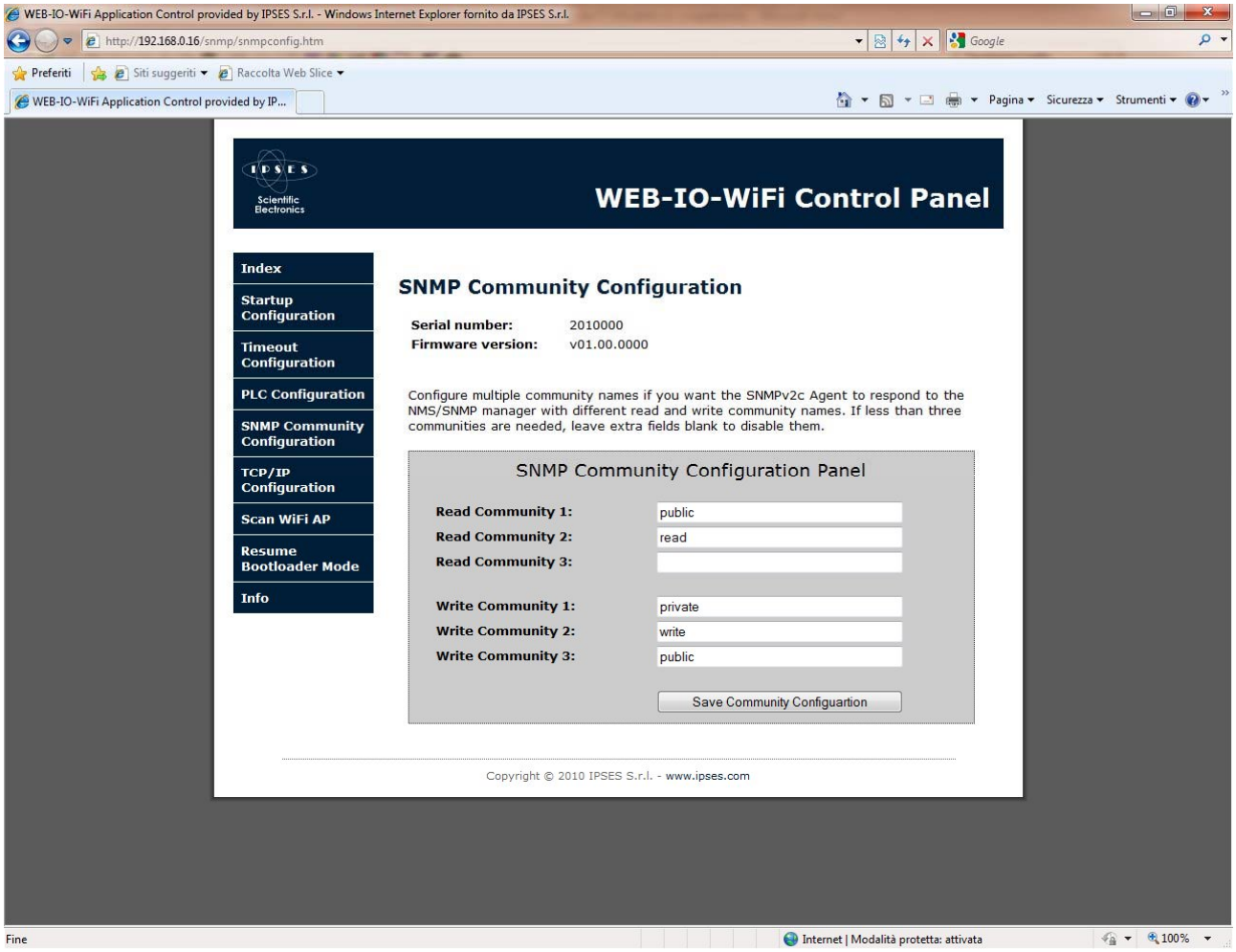
IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com



Picture 10: Programmable Logic Configuration (PLC) page.

PLC Configuration page, shown in Picture 10, allows to manage each output in function of the customizable status of the inputs (from 0 to 15). For example, as shown in picture above, user can set the output n. 1 to switch on when inputs 1-3-6-11 are high and inputs 2-12 are low (other inputs are *don't care*).
To do this, select the desired output through the *Select Output* ring in the upper part of the PLC configuration panel. In the same panel, the *Saved Output Mask* field and *Saved Output Filter* field show the stored values for that output. Clicking on *Set Output Mask* checkbox field and *Set Output Filter* LED field it is possible to configure new mask and filter settings. If an input is not masked, it will be not considered from the logic function, independently of its filter status selection. To make the new values operative, click on *Save PLC Setting*.
When the PLC function is enabled on an output, the output status will be set according the customizable input status. For this reason, it will be not possible to manually set that output until the PLC function is enable. To do this, user needs to disable the PLC function.
To disable the PLC function on an output, all inputs must be not masked: the relative item in the *Select Output* ring will became grey, otherwise it will remain blue.
The *Disable All PLC Mask* button in the lower part of the PLC panel allows to reset and store the mask of each output, without modifying the filter settings.
The *Timeout* function (previously described and shown in Picture 7) has priority over PLC function: if timeout occurs, all PLC enabled functions are temporarily disabled until the board will receive a new command or request.

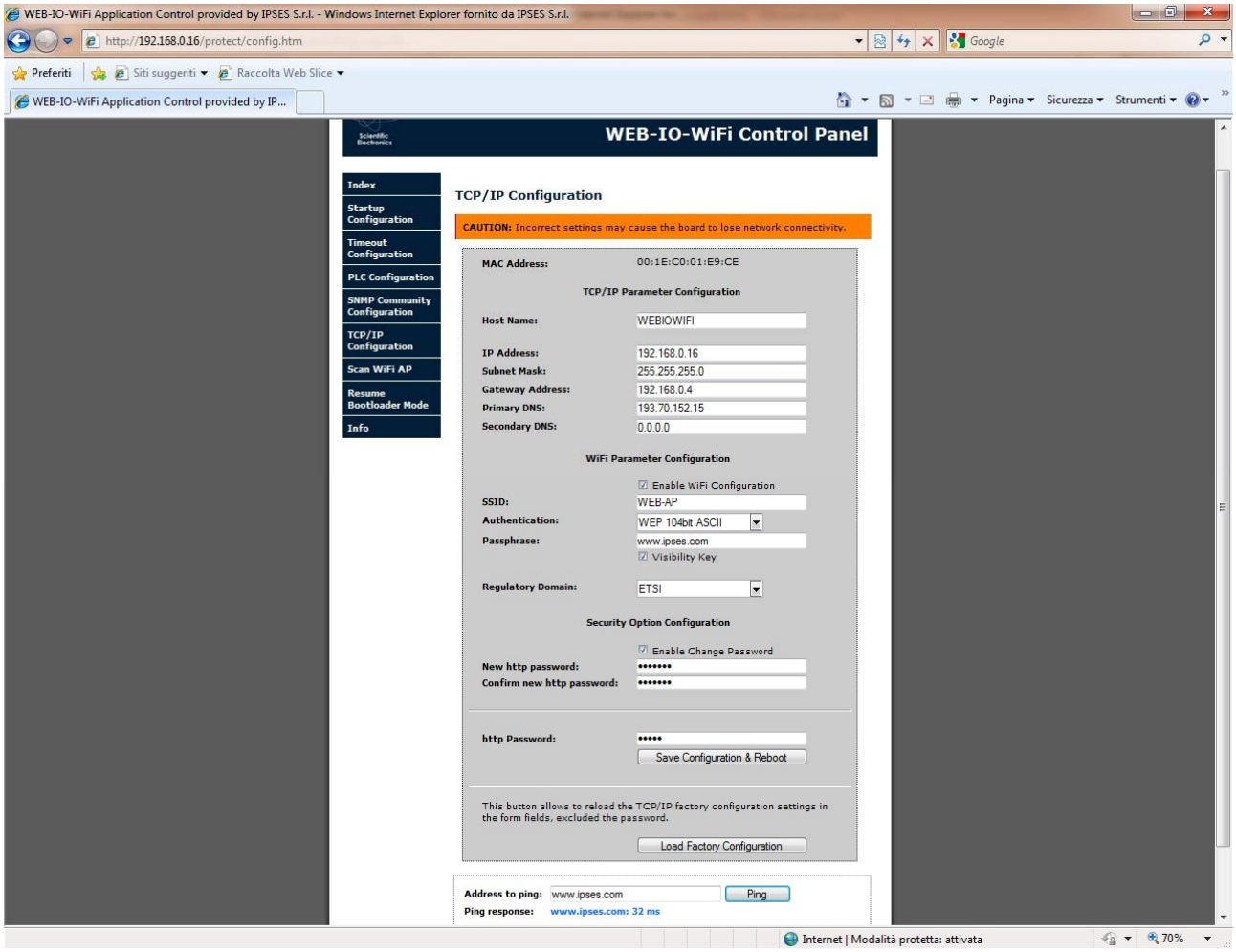
IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com



Picture 11: SNMP Community configuration page.

The *SNMP Community Configuration* page, shown in Picture 11, allows to set the read and write communities for the SNMP server V2c.
Each community can be a case-sensitive alphanumeric string, with a maximum length of 8 characters. If you do not want to set one or more communities, leave the extra fields blank.
If all fields are left blank, it will be impossible to access to SNMP server.
The queries run in the MIB browser can be evaluated from the SNMP server only if the community with which the request is generated is included in the configuration list.
The button *Save Community Configuration* stores the settings on the board.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com



Picture 12: TCP/IP protocol, AP access parameters and *http* password configuration page.

TCP/IP Configuration page, shown in Picture 12, allows to modify some TCP/IP protocol parameters, the configuration parameters for the WiFi Access Point and the *http* password of the board.
The *hostname* (for NetBIOS protocol) can be maximum 16 alphanumeric case-insensitive characters length.
The WiFi settings are not saved by default: to enable this option click the *Enable WiFi Configuration* field. Now, these fields are enabled and they can be modified.
The *SSID* field accepts a string from 2 and up to 32 alphanumeric chars, without spaces.
The *Authentication* field allows to select the kind of protection implemented by the AP and the format of the key to insert into the *Key/Passphrase* field, as described in the following table:

Authentication	Key	Description
Open	None	The AP does not required a key
WEP 40bit hex	WEP-40bit	It is required a key of 5 pairs of chars (byte) in an hexadecimal format (i.e.: “6970736573”)
WEP 40bit ASCII	WEP-40bit	It is required a key of 5 alphanumeric chars (i.e.: “ipses”)
WEP 104bit hex	WEP-104bit	It is required a key of 13 pairs of chars (byte) in an hexadecimal format (i.e.: “7777772E69707365732E636F6D”)
WEP 104bit ASCII	WEP-104bit	It is required a key of 13 alphanumeric chars (i.e.: “www.ipses.com”)

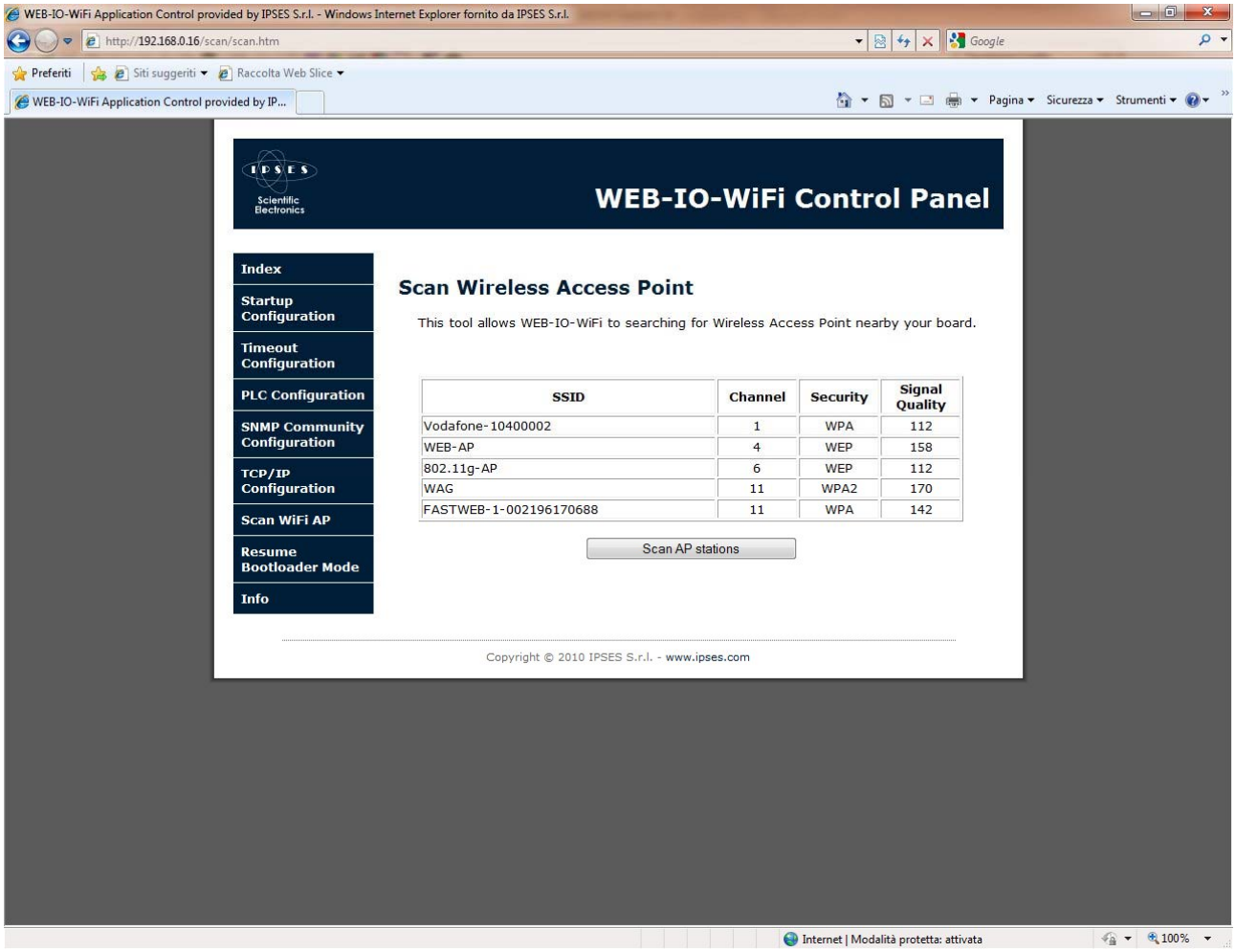
IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

WPA Key	WPA-Personal	It is required a key between 8 and 64 pairs of chars (byte) in an hexadecimal format (i.e.: "69707365732D574542")
WPA Passphrase	WPA-Personal	It is required a key between 8 and 64 alphanumeric chars (i.e.: "ipses-WEB")
WPA2 Key	WPA2-Personal	It is required a key between 8 and 64 pairs of chars (byte) in an hexadecimal format (i.e.: "69707365732D574542")
WPA2 Passphrase	WPA2-Personal	It is required a key between 8 and 64 alphanumeric chars (i.e.: "ipses-WEB")

The *Visibility Key* checkbox allows to hidden the network key: if the option is enabled (factory condition) the *Key*/*Passphrase* field shows the current key stored on the board when the http page is loaded; otherwise this field will be highlighted in yellow, to indicate the invalid value. It is necessary to edit a valid key.
This option influence also the *telnet* service: if the visibility is hidden, the message "*Hidden Key*" will be printed if authentication is not *Open*.
The Regulatory Domain field allows to select the regional domain, regarding to *ANSI/IEEE Std. 802.11, 1999 Edition* and following integration, as described in the *WiFi Module* paragraph. The domain selected will be active only by the next power-up of the board.
To maintain the certification of own country, it is mandatory to set correctly this field.
To modify and save these parameters, it is necessary to insert a valid *http* password then press the *Save Configurations & Reboot* button. If the password is invalid or the data processing fails, the set parameters will not be saved and you will be redirect to an error page. To came back, click on the appropriate link.
To modify the http password, enable the *Enable Change Password* option, then insert a new valid password in the *New Password* field and repeat it in the *Confirm New Password* field. If the passwords inserted are different, a message error will be shown.
The *Load Factory Configuration* button allows to restore factory parameters, excepted for the *http* password that will not be modified.
At the end of the page is available the Ping function which allows to verify the connection between card and inserted address. If the communication is lost, the ping section shows the following error message: "*Connection to WEB-IO-WiFi board was lost*".

Warning: if the saved parameters are invalid or they could not be resolved in your network, you will lose the communication. To restore all default parameters, follow the procedure described in "ADDRESSES CONFIGURATION" paragraph.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com



Picture 13: Scan Wireless Access Point page, with an example of founded networks.

The utility in the *Scan Wireless Access Point* page allows the WiFi module to search for wireless network in the surrounding area. The search result will be shown in a dedicated table.
The *Scan AP stations* button starts the wireless networks searching process: during this phase the button will be disabled and it will be enabled at the end of the search. The searching time can take some seconds.
The parameters listed in the result table are:

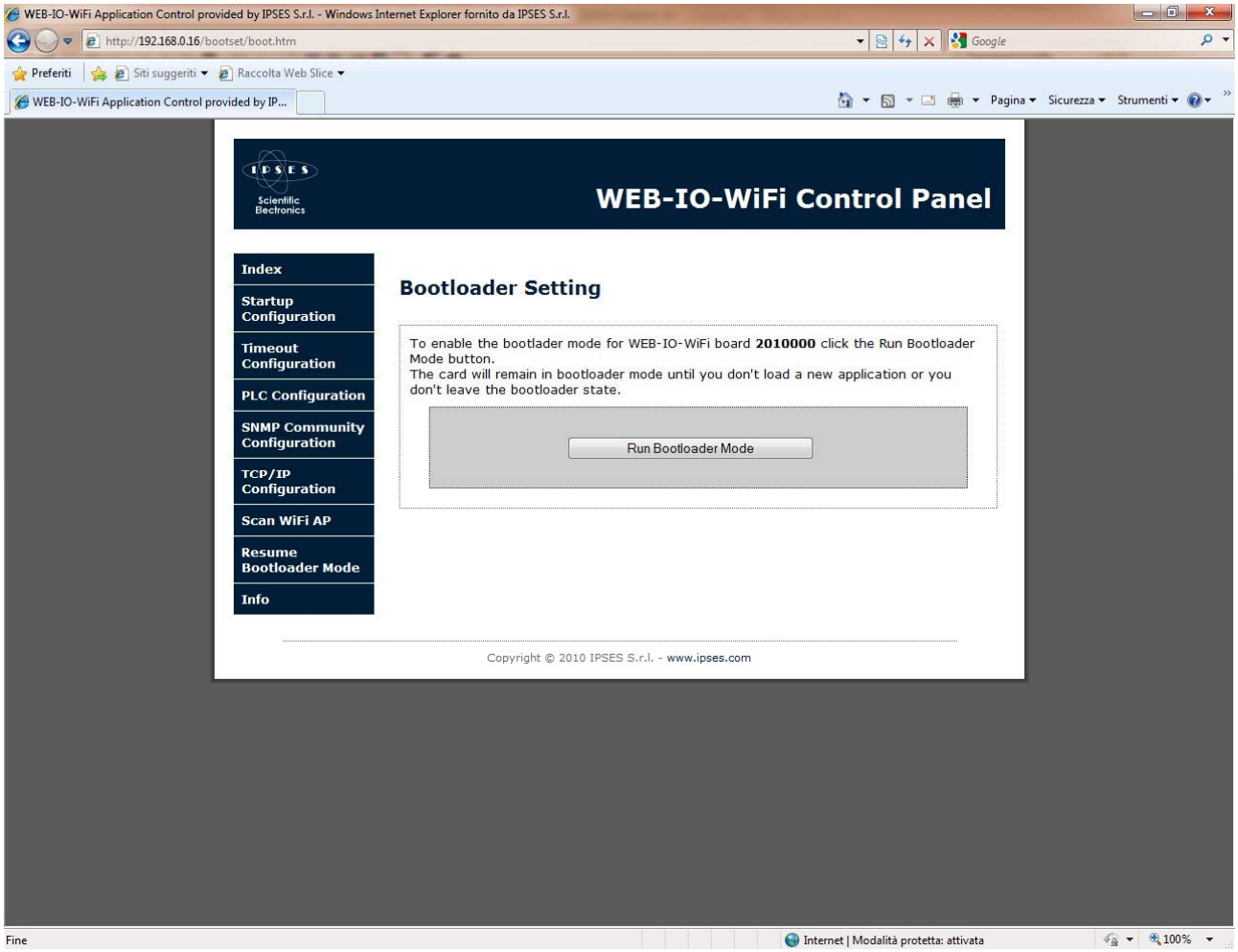
- *SSID*: Access Point *Service Set Identifier*
- *Channel*: communication channel in the available band (regarding the *Regulatory Domain*)
- *Security*: authentication implemented by the Access Point
- *Signal Quality*: indication of the wireless signal quality detected by the WiFi module.

The indication of the signal quality is mapped with a scale of values in the 0-255 range: greater is the value, better is the quality of wireless signal.

Attention: this *Scan* function is available only when the board runs with wireless interface active.
In case of the card runs with cabled interface, the searching button will be disabled and the page shows a warning message: "*Scan tool is available only while the board uses the wireless interface.*"

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

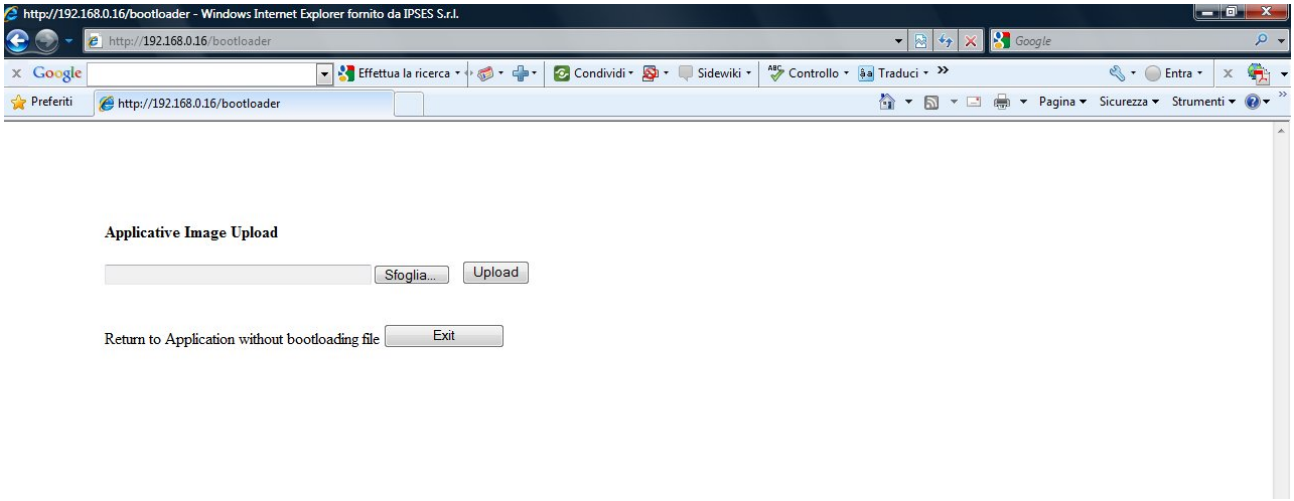
The scan process check for the presence of the Access Points on each channel thanks to the transmitted SSID detection. If an AP does not send its SSID, it cannot be detected.
It is possible that during the detection temporal window of a channel, the AP, also if present, does not transmit its SSID in time (especially if the broadcasting time is high): this can compromise the AP detection. We recommend to perform the scan procedure several times, to ensure to identify all visible WiFi networks.



Picture 14: Bootloader mode access page.

The *Bootloader Setting* page, shown in Picture 14, allows to run the bootloader mode on the board for a firmware upgrade. Clicking on the *Run Bootloader Mode* button you will be redirect to the following network address: http://*current-ip*/bootloader (where *current-IP* is the current IP address of the board, i.e. 192.168.0.16).
Picture 15 shows the only page reachable in Bootloader mode: the board runs only with Ethernet interface, regardless the jumper J4 status.
Until the board remain in this state, the SNMP server and the telnet server are unreachable, while all the outputs and *PLC* and *Timeout* function are disabled.

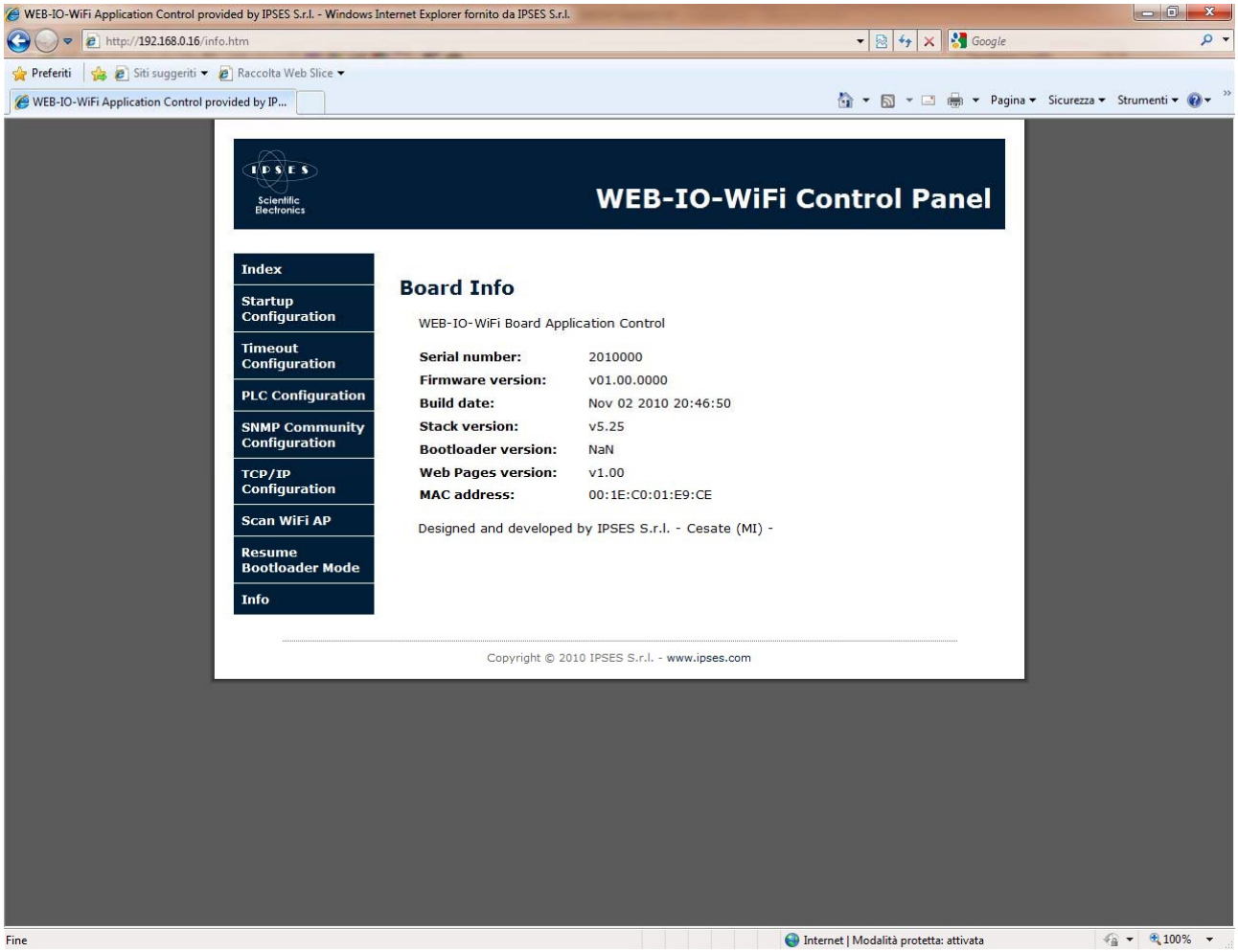
IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com



Picture 15: Firmware upgrade page.

The *Search* button allows to select the .bin file with the new firmware, and the *Upload* button starts the installation process. If the upgrade is completed successfully, the board will automatically return in Operative mode and you will be redirect to *index* page.
To exit the Bootloader mode with no upgrade, click the *Exit* button.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com



Picture 16: Firmware version information page.

The *Board Info* page, shown in Picture 16, lists the main information concerning firmware version running on the board. Note that the MAC Address shown in this page is referred to the physical network interface active.

I/O MANAGEMENT THROUGH http

The WEB-IO-WiFi board can be interfaced to embedded system where should be useful to command or to read the I/O status through *http* protocol, without perform a parsing of the previous described web pages.

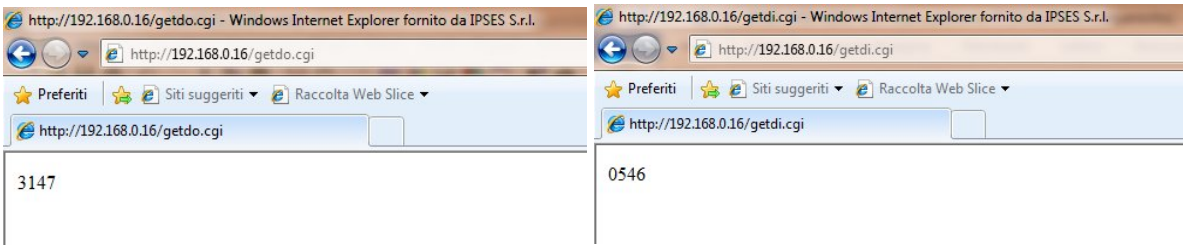
The I/O reading can be performed by edit in the URL the following address: http://**current-ip/file**, where **current-ip** is the board address (i.e.: 192.168.0.16) and **file** is one among the following files:

- getdo.cgi read the digital output status in hexadecimal format (MSB is Out15 and LSB is Out0).
- getdi.cgi read the digital input status in hexadecimal format (MSB is In15 and LSB is In0).

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

To set a digital output edit in the URL the following address: http://**current-ip**/digbutton.cgi?dbtn=**x**, where **x** is referred to the digital output desired (0-15).
This command acts on the selected output by performing a change of its current status: it does not allows to select the logical level (high or low), but only to perform a toggle, unless the output is not tied to a logical level by the PLC function active.

The http page shown by the board as response to these commands is a blank page: the user must take care to digit correctly the URL addresses and the parameters.



Picture 17: Example of answers to getdo.cgi and getdi.cgi files.

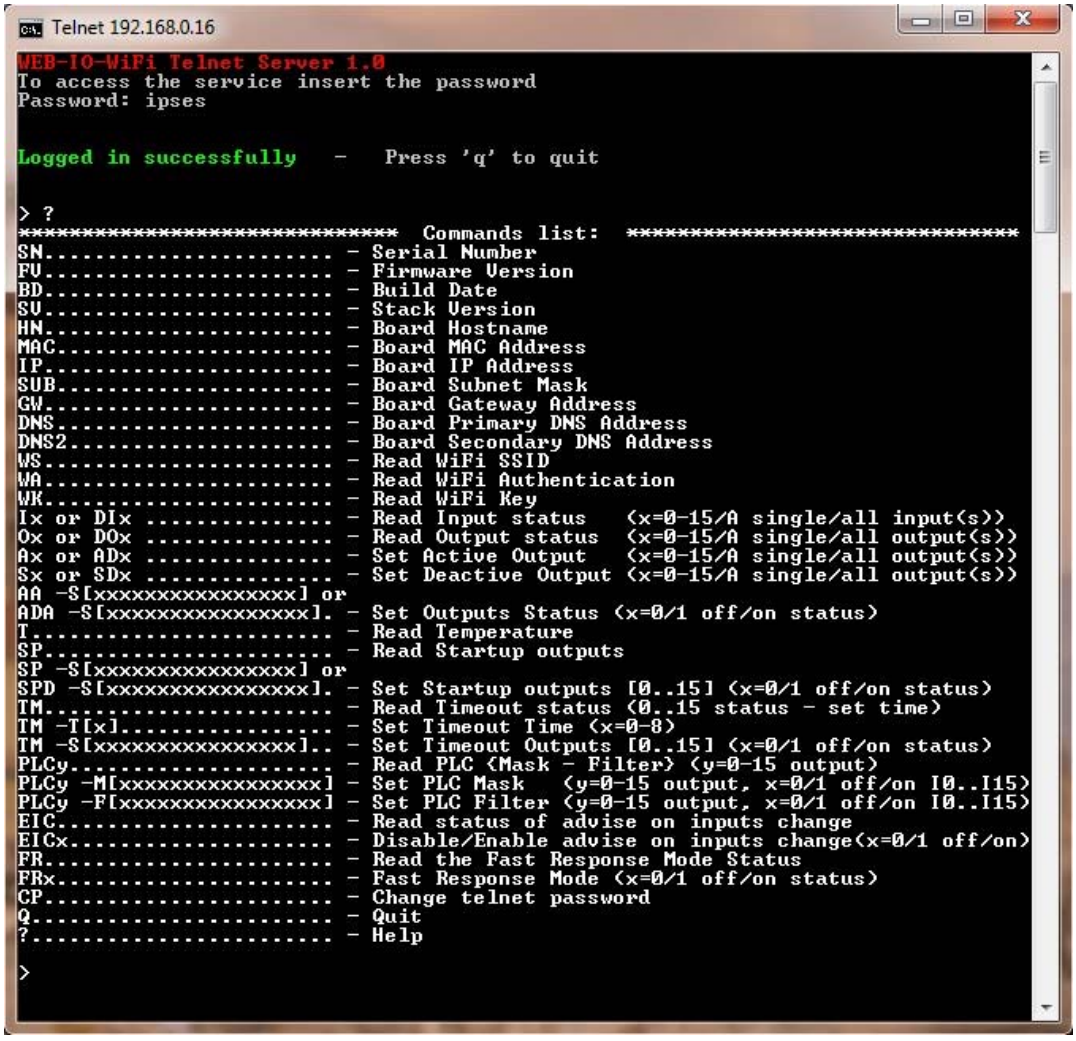
IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

telnet SERVER

To connect to the *telnet* server implemented on the board it is enough a telnet client program (as the client installed in your operative system or the *hyperterminal*).
The configuration parameters of the client must be:

- telnet communication port: 23;
- echo: on (if you want to see typed characters);
- termination characters: <CR LF> (\r\n).

Picture 18 shows the initial snapshot: to access the server, insert the *telnet* password, then press "Enter".



Picture 18: *telnet* server access page and help request.

This service allows to read the I/O status, to read card parameters and to control outputs. All commands are case-insensitive.
Commands list:

Command	Description	Answer type

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

Q	Closes telnet connection	
SN	Requests board serial number	1
FV	Requests firmware version	1
BD	Requests firmware build date	1
SV	Requests TCP/IP stack version	1
HN	Requests board hostname	1
MAC	Requests board MAC address	1
IP	Requests board IP address	1
SUB	Requests board Subnet mask	1
GW	Requests board Gateway address	1
DNS	Requests board Primary DNS server address	1
DNS2	Requests board Secondary DNS server address	1
WS	Requests current SSID for the WiFi connection	1
WA	Requests current Authentication type for the WiFi connection	1
WK	Requests current Key for the WiFi connection	1
Ix or DIx	Requests input status (x = 0-15 / A → all)	2
Ox or DOx	Requests output status (x = 0-15 / A → all)	2
Ax or ADx	Actives related output (x = 0-15 / A → all)	3
Sx or SDx	Disables related output (x = 0-15 / A → all)	3
AA -S[xxxxxxxxxxxxxxxx] or ADA –S[xxxxxxxxxxxxxxxx]	Sets the status of each output, from Out0 to Out15	3
T	Requests measured temperature	1
SP	Requests all startup outputs status	2
SP –S[xxxxxxxxxxxxxxxx] or SPD –S[xxxxxxxxxxxxxxxx]	Sets startup status (x = 0/1 – Off/On) of each output, from Out0 to Out15	3
TM	Requests timeout settings (outputs status Out0..Out15 – timeout time [0-8])	1
TM –T[x]	Sets timeout time (x = 0-8)	3
TM –S[xxxxxxxxxxxxxxxx]	Sets timeout status (x = 0/1 – Off/On) of each output, from Out0 to Out15	3
PLCy	Requests mask and filter settings (M0..M15 – F0..F15 related to In0..In15 inputs) for the y output (y = 0-15)	1
PLCy –M[xxxxxxxxxxxxxxxx]	Sets the mask status (x = 0/1 – Off/On) of each input, from In0 to In15, for the y output (y = 0-15)	3
PLCy –F[xxxxxxxxxxxxxxxx]	Sets the filter status (x = 0/1 – Off/On) of each input, from In0 to In15, for the y output (y = 0-15)	3
EIC	Requests the operating status of the notification of change of inputs	4
EICx	Enable/Disable the notification function of change of inputs (x= 0/1 – Off/On)	3
FR	Requests Fast Response status (0/1 = Off/On)	4
FRx	Set Fast Response status (x=0/1 – Off/On)	3
CP	Enables telnet service password	
?	Command help	

The typing of an excessive number of chars (over 29) saturates the receiving buffer of the card and consequently the session will be lost.

The following table lists the kind of answer related to the edited command:

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

Answer type	Description
1	The answer, by default, is preceded by a 18 chars length descriptive string. For example the SN command generates the following answer: "Serial number: 2010000". If FR option is on, the introductive string is omitted: "2010000".
2	The answer, by default, is preceded by a descriptive string with variable length, related to the typed command. If the FR option is on, the introductive string is omitted.
3	The answer to these I/O setting commands is: "\x1b[34mdone \x1b[0;1m".
4	The answer is made by a single char: 0 = Off, 1 = On.

The next table encode the timeout time parameter used in TM and TM –T[x] commands:

Parameter	Value
0	No timeout
1	5 seconds
2	10 seconds
3	30 seconds
4	1 minute
5	5 minutes
6	10 minutes
7	30 minutes
8	1 hour

DEVELOPMENT OF CONTROL APPLICATIONS WITH *telnet* PROTOCOL

It is possible to develop a control application for the WEB-IO-WiFi board based on telnet Server: the user program should be able to manage the strings generated from the server.
The following are the strings used in the program, with a brief description of them.

Server telnet access string.
"\x1b[2J\x1b[31m\x1b[1mWEB-IO-WiFi Telnet Server 1.1\x1b[0m\r\nTo access the service insert the password \r\nPassword: "

Answer string to incorrect password: the telnet socket will be closed.
"\r\nAccess denied\r\n\r\n"

Answer string to correct password: the command prompt will be shown.
"\r\n\r\n\x1b[1;32mLogged in successfully\x1b[0m - Press 'q' to quit\r\n\r\n"

Command prompt: it is shown after each command executed, except CP command.
"\r\n> "

Answer string to each invalid command or request
"\x1b[33merror\x1b[0;1m"

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

UTILITY DESCRIPTION

The EICx (Advise on Input Change) command allows to enable or disable the printing of the status of all inputs, in hexadecimal format, every time there is a change of almost one input.
The command is disabled by default at every server access.

The FRx (Fast Response) command allows to enable or disable the printing of the descriptive strings. This utility is useful to write codes in which the program focus his resource only to process the data received in a synthetic form, without parsing all the strings.
The command is disabled by default at every server access.

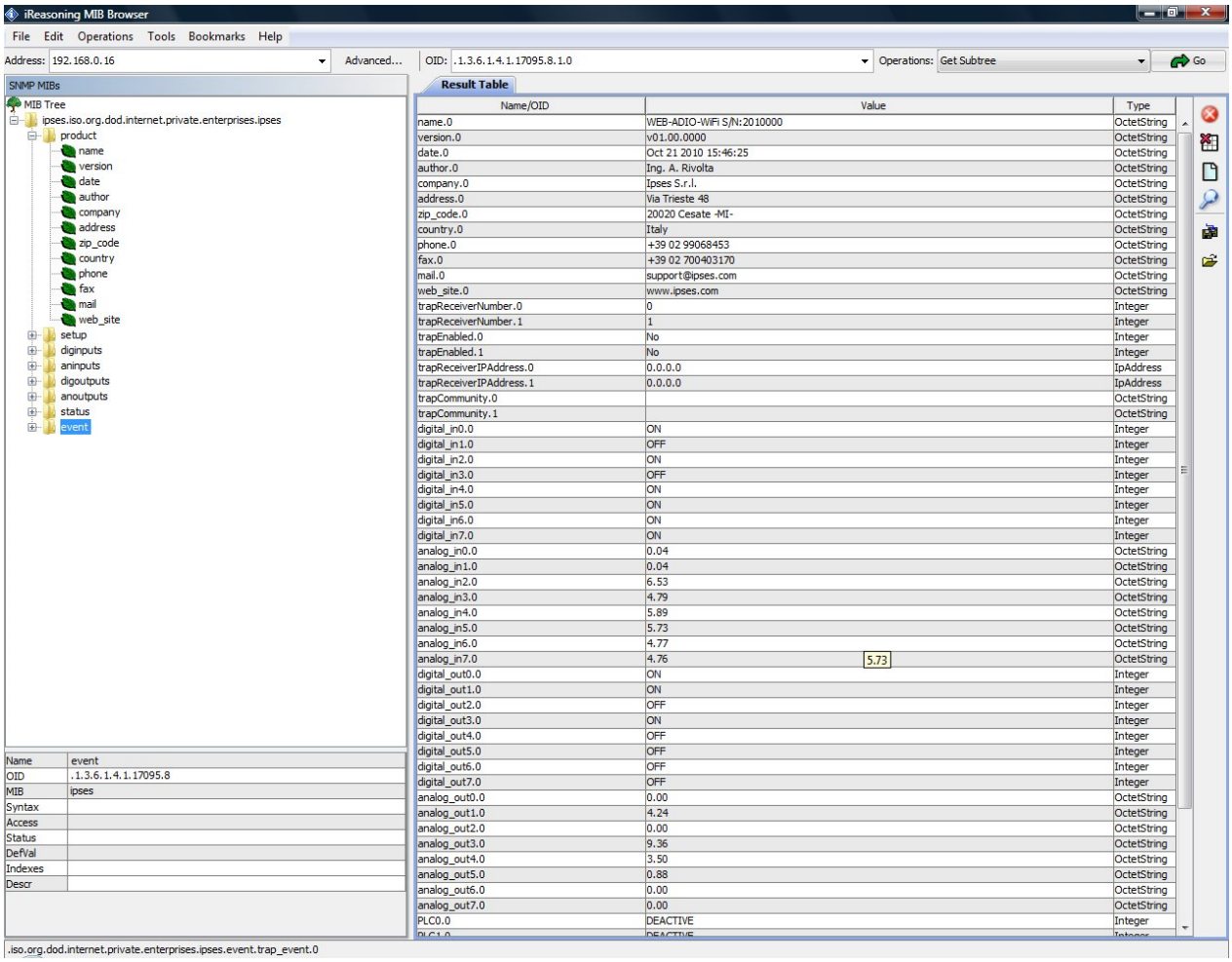
The CP (Change Password) command is made by three phases: in the first it is requests to insert the new password:
"\r\nEnter new password: "
Next is request to confirm the new password:
"\r\nConfirm new password: "
Now, if the passwords match is valid, the answer string will be:
"\r\n\r\nPassword changed successfully!\r\n"
Otherwise it will be:
"\r\n\r\nPassword change fails!\r\n"
The change of the password in telnet does not perform a reboot of the board or the automatic disconnection from the current session, on the contrary to what happens in the analogous http service. Obviously, next telnet access to board, here included the use of demo software, must be authorized by the new password.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

SNMP SERVER

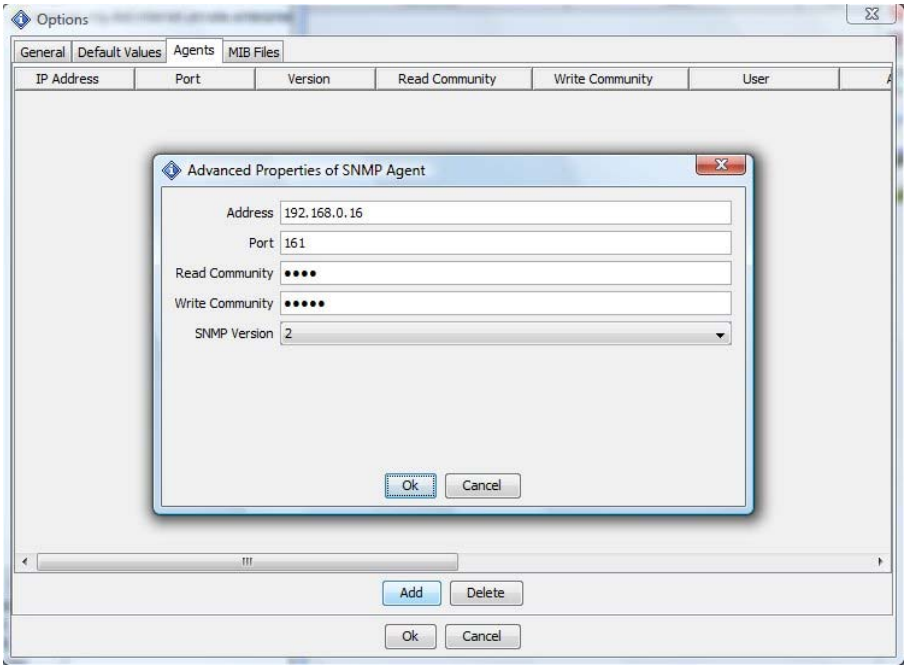
To connect the SNMP server implemented on the board it is possible to use any MIB browser program, like *iReasoning MIB Browser*[2].
After starting the communication with the board it is necessary to be sure the browser is correctly configured, with the following check list.

- The MIB Tree must include the .mib file provided with the CD. To load it, use the command "File → Load MIBs" and search through the folders, selecting the file *webiowifi.mib*.
- The Agent must be configured properly with communities parameters. To verify it, use the command "Tools → Options" and select the tab Agents. The *Add button* allows to configure a new Agent, setting IP board address, Port (161), Version (2), Read and Write Communities.



[2] Downloadable from www.ireasoning.com web site

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com



Picture 19: MIB browser and SNMP Agent configuration.

Picture 19 shows the MIB browser and the configuration of the SNMP Agent parameters.
The MIB Tree has eight branches, each of them has several leafs:

- *product*, where to read information about the board
- *setup*, where to set the parameters for two different traps
- *inputs*, where to read input status
- *outputs*, where to read or set the output status
- *status*, where to read the PLC and Timeout function status (On/Off) and the temperature sensor.
- *event*, which is the container of the variables associated to the Trap's event.

Using SNMP server is not possible to configure the PLC and Timeout functions.

The *Operations* selector specifies the request to be sent to the server. The answers to reading requests are shown in the Result Table; instead, to set a parameter, is mandatory to insert the value, according to the kind specified, in the relevant form of the pop-up window.
For further information about commands and functions, consult your browser helper.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

TRAP EVENTS

The SNMP server implemented on WEB-IO-WiFi board can generate two separate Trap events, both of them associated to a change of the inputs status. Each event can be configured independently.
The Traps generated are compliant to v2c protocol specification and the information is stored in a sequence of two varbinds as 16 bit format: the first one encoding the input status (In0 – In15), the second one encoding the output status (Out0 – Out15).

The parameters to configure, for each event, are:

- trapEnable: 0/1 respectively to disable/enable the event notify.
- trapReceiverIPAdrress: IP address of the receiver machine (i.e. the IP address of your PC).
- trapCommunity: a valid community name to receive the event notify.

By default, the parameters of the Trap events are reset at every rebooting: to avoid this condition set the *save_option* variable in the *setup* path before to configure the parameters values. If the save_option variable is deactivated at the startup, the parameters are resetted.

To see in your mib browser the list of the events generated, is necessary to open the *Trap Receiver* window with the "Tools → Trap Receiver" command.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

PROBLEMS RESOLUTION:

The next section lists some procedure steps to investigate board malfunctions. If the problem will be not solved, contact the technical support of IPSES S.r.l. sending the Engineering Problem Report included in this manual or downloadable from IPSES website at the following address *http://www.ipses.com/PDF/IPSES-engineering_problem_report.pdf*

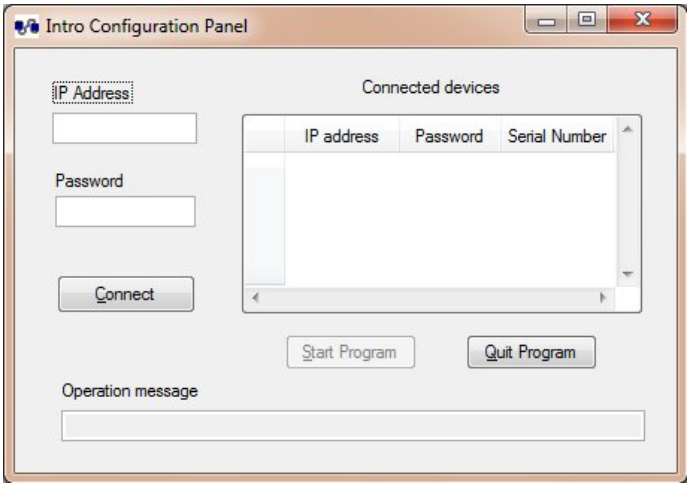
- Verify the correct power supply and operation of the board (see status LEDs).
- Verify the correct connection of the network cable both on board and LAN side (network card, switch …) and if the board is visible from the network (if cabled interface is active).
- Verify the compatibility of board addresses (IP, subnet, gateway) in the operative network. If there is no compatibility, ensure to configure them properly.
- Verify the SSID, Authentication and Key parameters are correctly configured to connect to the AP (if wireless interface is active).
- Try to ping the IP address of the board.
- Make sure the IP address in the URL field is correct (*http* service).
- Verify there are no more than 5 simultaneous connection opened on the same board (*http* service).
- Make sure the password inserted in the TCP/IP Configuration page is correct (*http* service).
- Make sure the *telnet* communication port is number 23 (*telnet* service).
- Make sure the *telnet* access password is correct: it is case sensitive (*telnet* service).
- Verify there is no telnet communication already active on the board, via telnet client or demo software (*telnet* service).
- Verify the DNS server addresses correctness for the ping query.
- Verify the address entered with the ping function (*http* service).
- Check the MIB browser is set properly through the .mib correct file loading and communities settings (SNMP service).

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

DEMO SOFTWARE

A CD with a demo software is provided with the card. This demo software for Windows O.S., based on *telnet* service, allows to manage the main functions of WEB-IO-WiFi. To use this software, it is necessary a telnet communication is not already opened on the card, while a *http* communication service can exist simultaneously with. This software allows to manage up to 100 WEB-IO-WiFi devices simultaneously connected to the network.

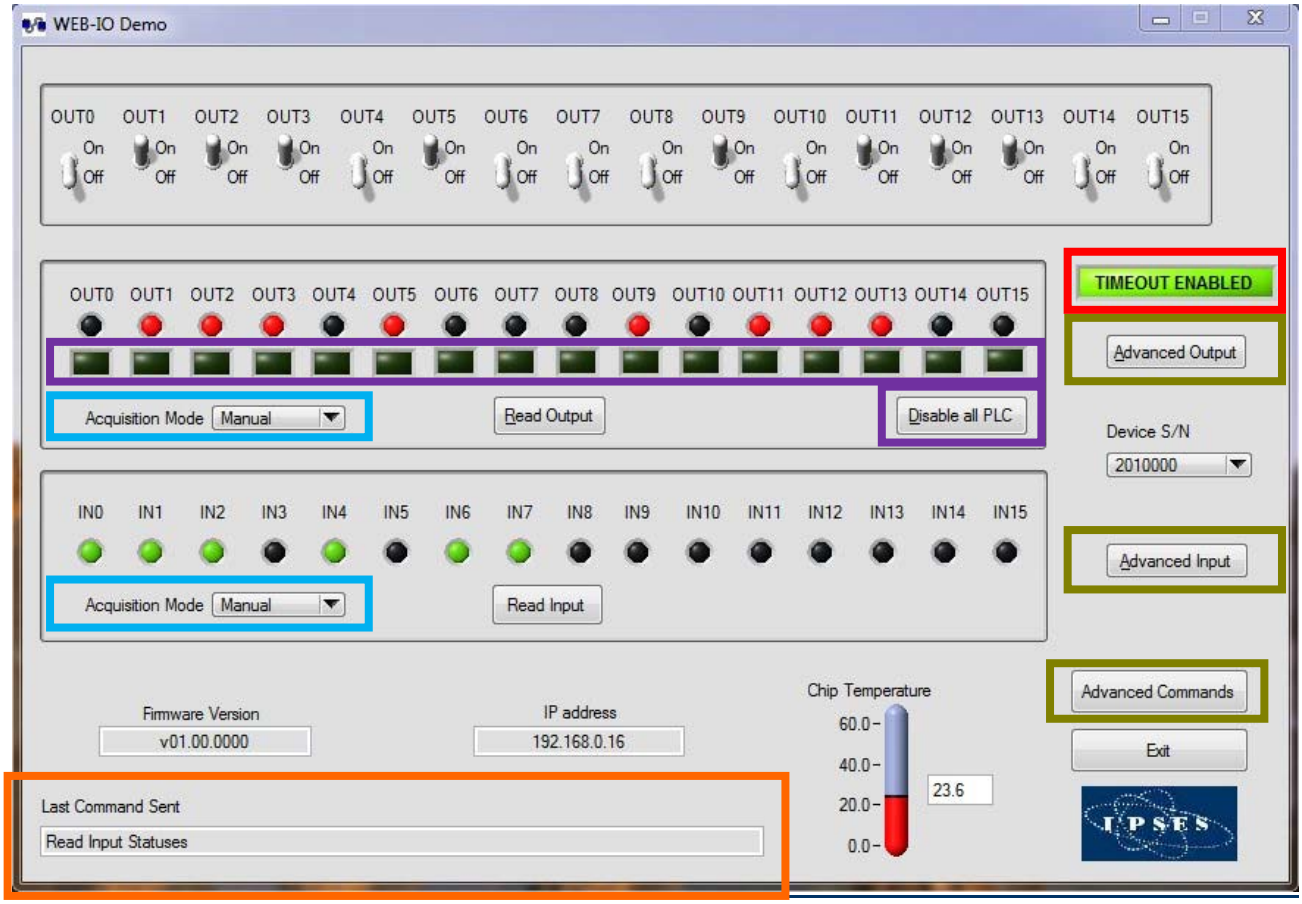
At the software start-up, the program shows a windows (Picture 20) where it is possible to initialize the devices connection to be managed through the software. To open the connection with a card, insert its *IP address* and its *telnet Password* in the relevant fields, then click on the *Connect* button. After few seconds, if the connection will be successfully opened, the *IP address*, *password* and *serial number* parameters of the board will be shown on *Connected devices* table; otherwise an error message will be shown in the *Operation message* indicator. The *Start Program* button will be enabled only when the connected device list will contain almost one connected device. It is no possible to add other devices once the initialization phase is terminated: to do this, close the program and restart it repeating the initialization steps.
The *Quit Program* button allows to close the software without opening the main window.



Picture 20: Initialization connection panel of the demo software.

In Picture 21a there is a snapshot of the main window of the software. To enable the control of one of the initialized cards it necessary to select its *Serial Number* from the *Device S/N* ring menu. The selection of a new board allows to automatically update the inputs and outputs status and to update *Firmware Version* and *IP Address* fields.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

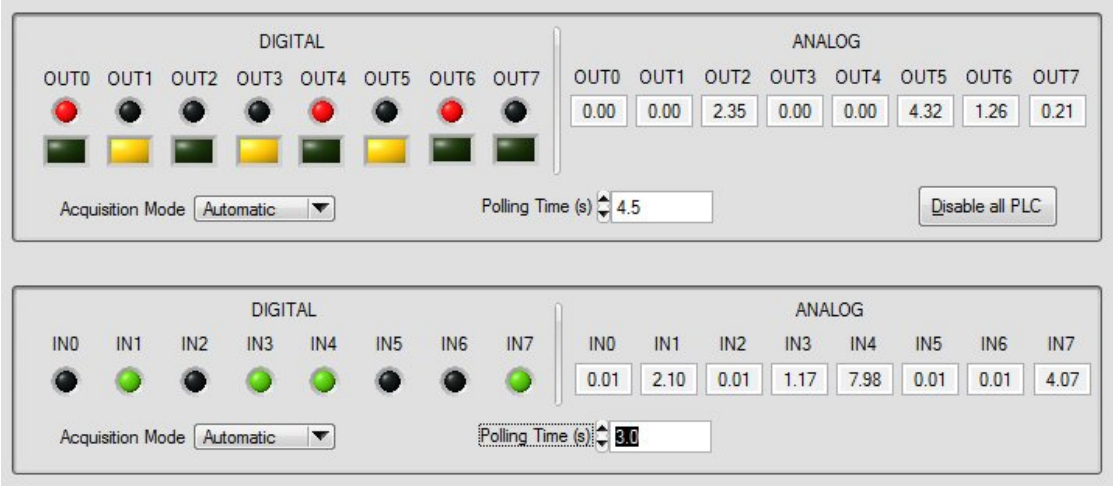


Picture 21a: Main windows of the demo software.

The field *Last Command Sent* (surrounded in orange in Picture 21a) shows the last executed operation.
In the upper section of the window there are the selectors and the controls to drive directly in real time the digital and analogical outputs.

while the *Read Output* button update the software output LEDs exactly as in the card (the software colour, red, is the same of the card).
Both logic inputs and outputs status can be achieved by two ways, thanks to the selectors ring menu (surrounded in blue in Picture 21a): the manual mode performs an asynchronous acquisition when you push respectively the *Read Input* button or *Read Output* button, while the automatic mode performs a continuous polling of the inputs and/or outputs state. The polling rate are customizable by the *Polling Time* controls (showed in Picture 21b): these fields accept values between 1.5s and 10s, with a step of 0.5s. In both cases, the relevant virtual indicators are updated at every acquisition: the software LEDs, with red colour for outputs and green colour for inputs, are associated to digital channels, while text indicators are associated to analogical channels.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com



Picture 21b: Automatic acquisition mode of the inputs and the outputs.

The objects in the purple section (see Picture 21a) allow to configure the masks and filters for PLC functions. Clicking on square LED referred to an output will appear a pop-up window, as shown in Picture 22.
For each output the square LED is on only when almost an input is masked, so the PLC function is enabled, otherwise it is off and the PLC function is disabled.
The *Disable all PLC* button resets and stores all masks for each output, without modifying any filter.

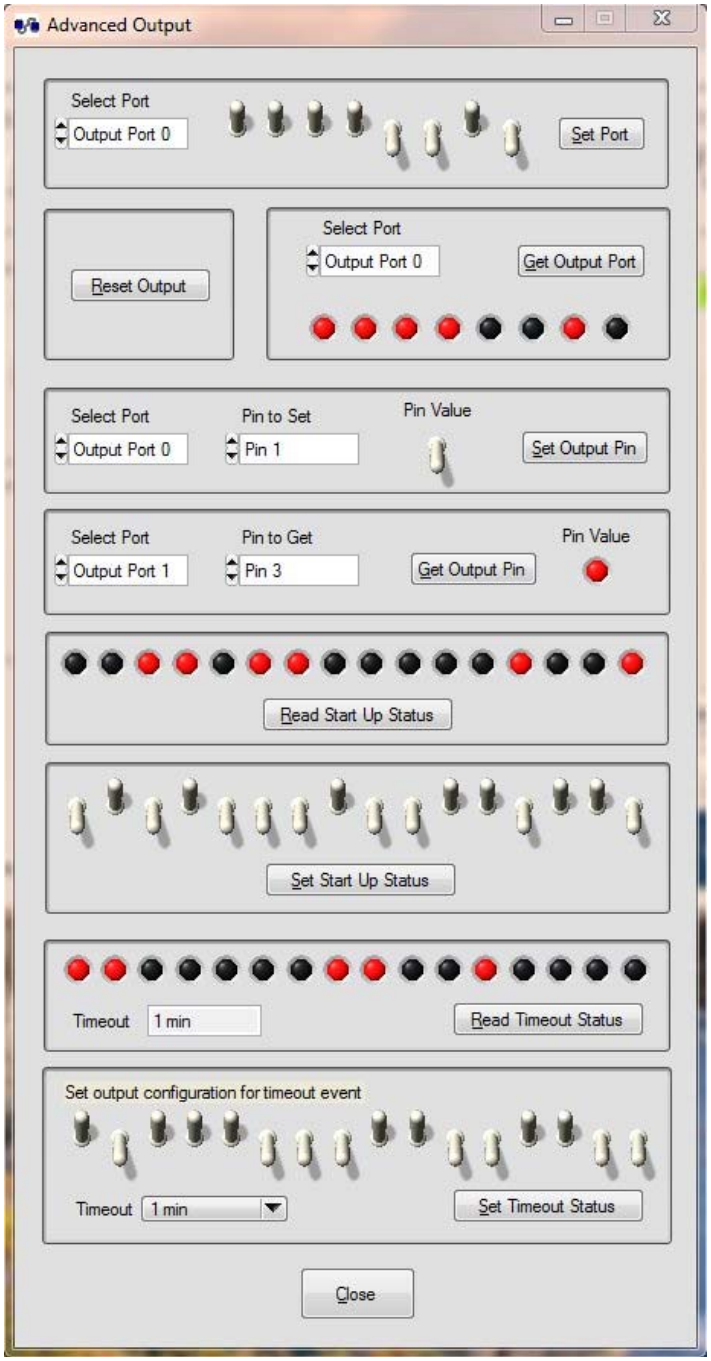
Picture 22: mask and filter PLC configuration pop-up window.

At the pop-up window loading, the mask and filter configuration currently stored for the selected output is shown.
If a mask of an input is enabled, it is possible to modify its filter status too, otherwise the last one is dimmed. To modify a filter status, click on the relative square LED.
If all inputs are not masked, the notify square LED, surrounded in blue in Picture 22, is off and the "DISABLED" message appears.
The *Set PLC* button allows to store the configuration settings, while the *Cancel* button close the pop-up window without saving them.
The square LED surrounded in red in Picture 21a shows the status of the Timeout function. If it is disabled, the LED is off and appear the TIMEOUT DISABLED message.

Three buttons on the right (surrounded in green in Picture 21a) allow to open three windows: one for the outputs (*Advanced Output)*, one for the inputs (*Advanced Input)* and the last one for the read and write commands in the non volatile memory (*Advanced Commands*).

The *Advanced Output* window (see Picture 23) allows the typical operations you can perform on the outputs of the device.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com



Picture 23: Advanced Output window.

The output commands are listed below:

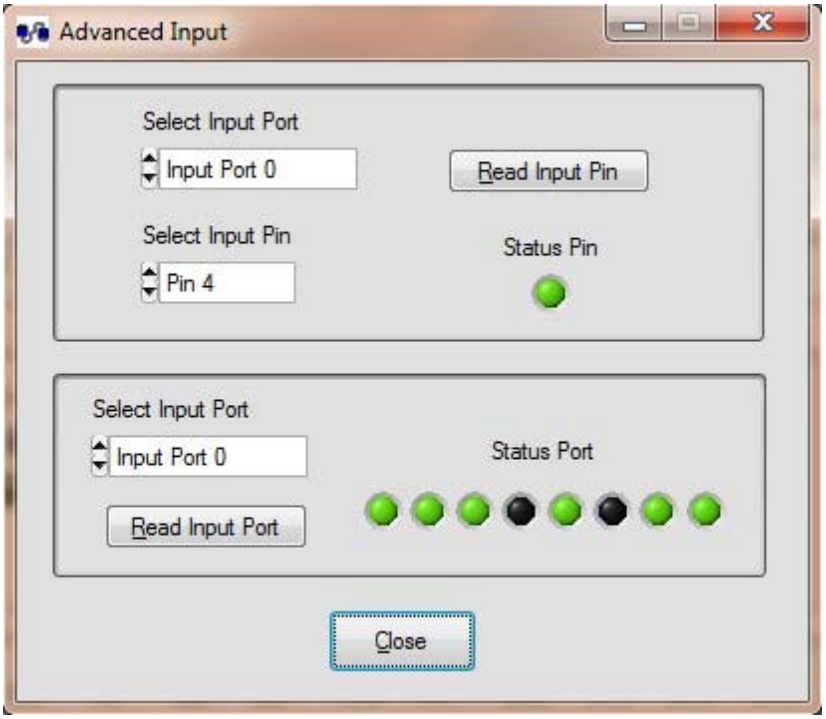
- Activation/Deactivation of each output for both ports
- Reset for the outputs (all outputs are switched off)
- Reading of the status of each output for each port
- Command and reading of a single output

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

- Reading of the start-up configuration
- Setting of the start-up configuration
- Reading of the Timeout function configuration (outputs status and timeout time)
- Settings of the Timeout function configuration (outputs status and timeout time)

Advanced Input window (see Picture 24) allows the typical operations you can performed on the inputs of the device.
The input commands are listed below:

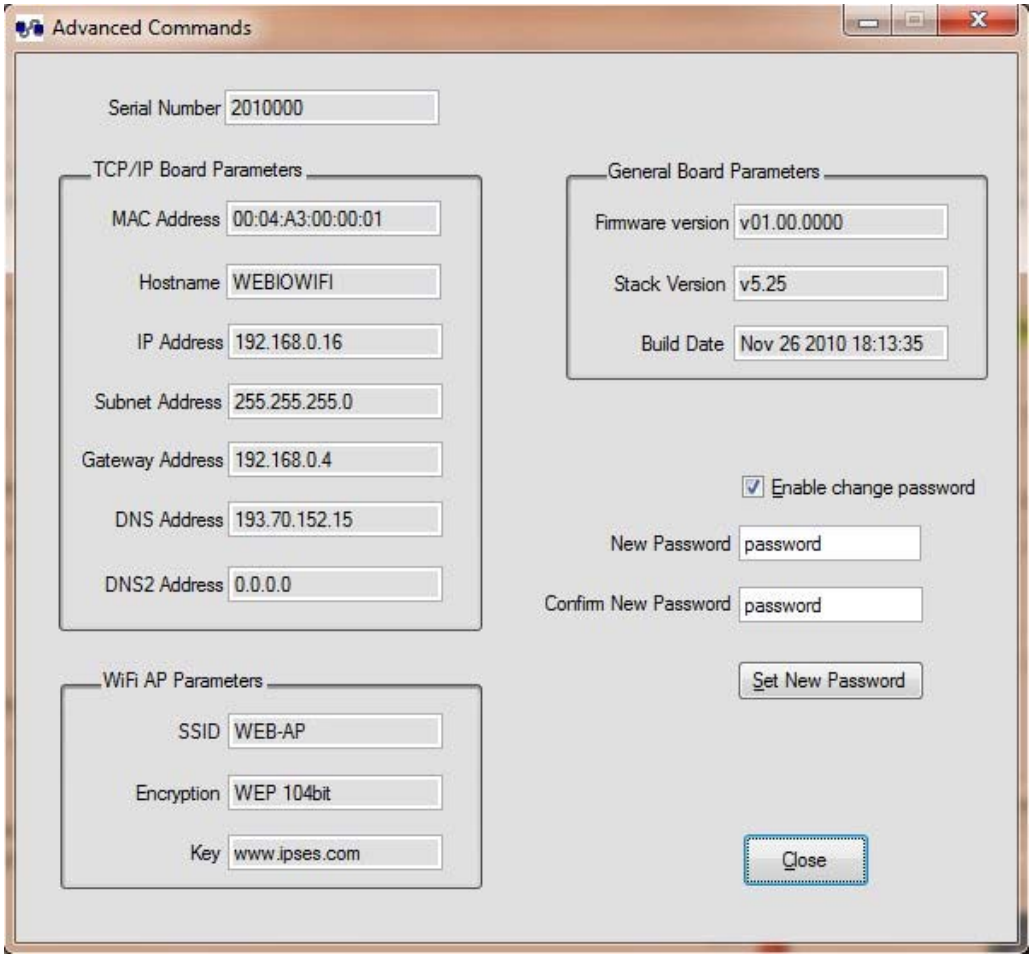
- Reading of the status of each input for each port
- Reading of the status of a single input



Picture 24: Advanced Input window.

The *Advanced Commands* window (see Picture 25) displays all TCP/IP, wireless configuration and firmware parameters of the current board and allows to change the *telnet* password.
The new *telnet* password must be inserted in the *New Password* field and replied in *Confirm New Password* field: it could be any alphanumeric strings with a valid length which is included between one and eight characters.
The *Enable Change Password* checkbox enables the *Set New Password* button. The result of the modifying command will be shown in the *Last Command Sent* field in the lower part of the main panel, while if an error is generated by the password validity check operation, the error message will be popped up.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com



Picture 25: Advanced Command window.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

TCP/IP ADDRESS CONFIGURATOR SOFTWARE

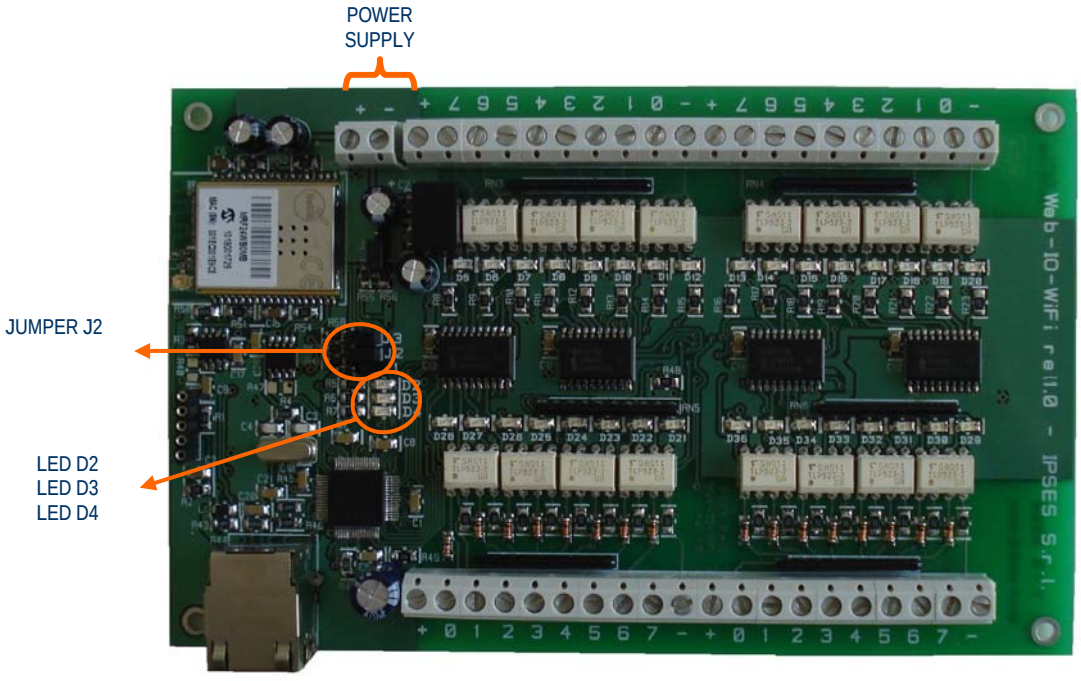
WEB-IO-WiFi Address Configurator, provided with the card, is a software which allows to configure remotely TCP/IP addresses and wireless parameters for WEB-IO-WiFi control units.
The configuration of the device is achieved through both Ethernet interface, than wireless interface. In the last case it is necessary that the card can connects itself to the Access Point, i.e. the SSID and authentication parameters must be correct.
To work properly, only one card per time must be set in address configuration mode, even if you have more than one WEB-IO-WiFi board connected.
WEB-IO-WiFi Address Configurator software is able to communicate with every IP address, excluded the reserved broadcast address (255.255.255.255). That means it is possible to configure also cards with out-of-net IP addresses.

ADDRESS CONFIGURATION MODE

To enable the hardware *address configuration* mode, follow the procedure listed below:

- with the WEB-IO-WiFi board already powered on, insert jumper J2 (see picture below).
- perform the desired software configuration.
- at the end of the configuration, remove jumper J2.

Do not disconnect the power supply during the address configuration procedure.
A supply reset, with the jumper J2 inserted, will restore the factory parameters.

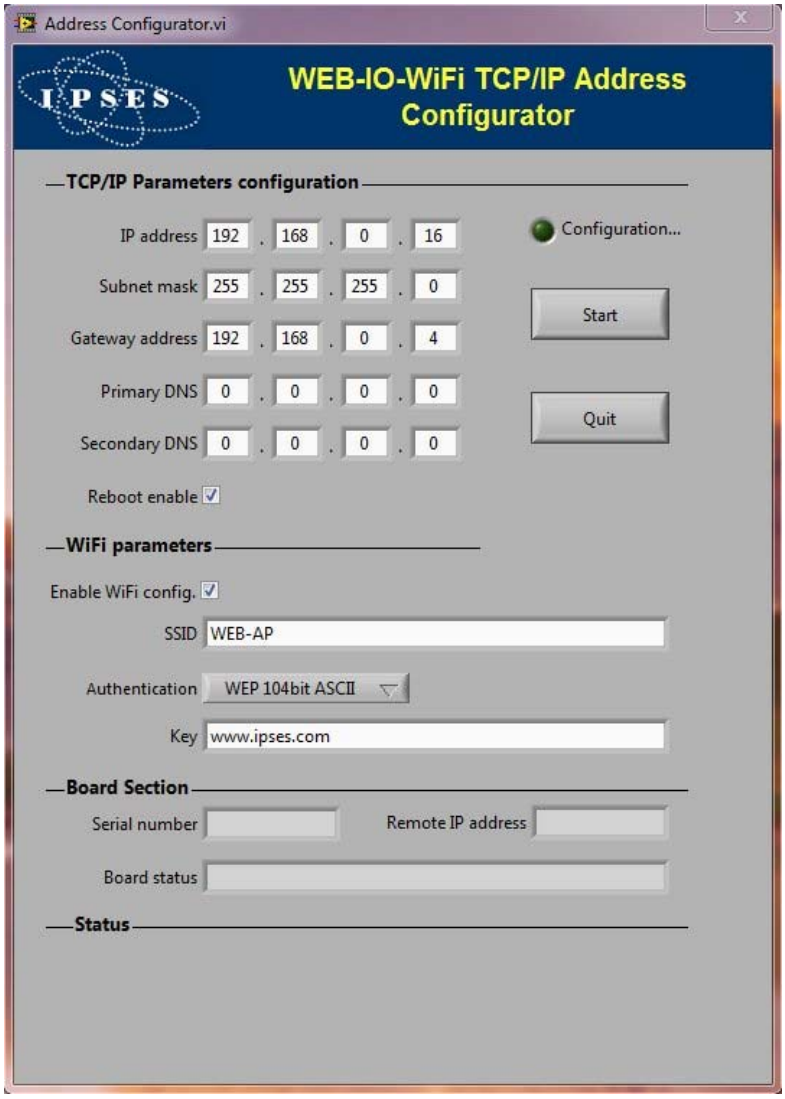


Picture 26: WEB-IO-WiFi card

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

ADDRESS CONFIGURATOR CONTROL PANEL

The *WEB-IO-WiFi Address Configurator* control panel, shown in Picture 27, allows to configure both TCP/IP parameters, like IP address, Subnet mask address, Gateway address and Primary and Secondary DNS server addresses, than wireless parameters to connect to the Access Point. The modification of these last ones can be enabled by the user.
Every field is saved on the board: it is important to compile each field with correct values.
The *Reboot enable* checkbox allows to perform a software rebooting of the card after the address configuration is successfully ended.
If the configuration process ends successfully, the status LEDs D2 and D3 on the board will flash for about one second.

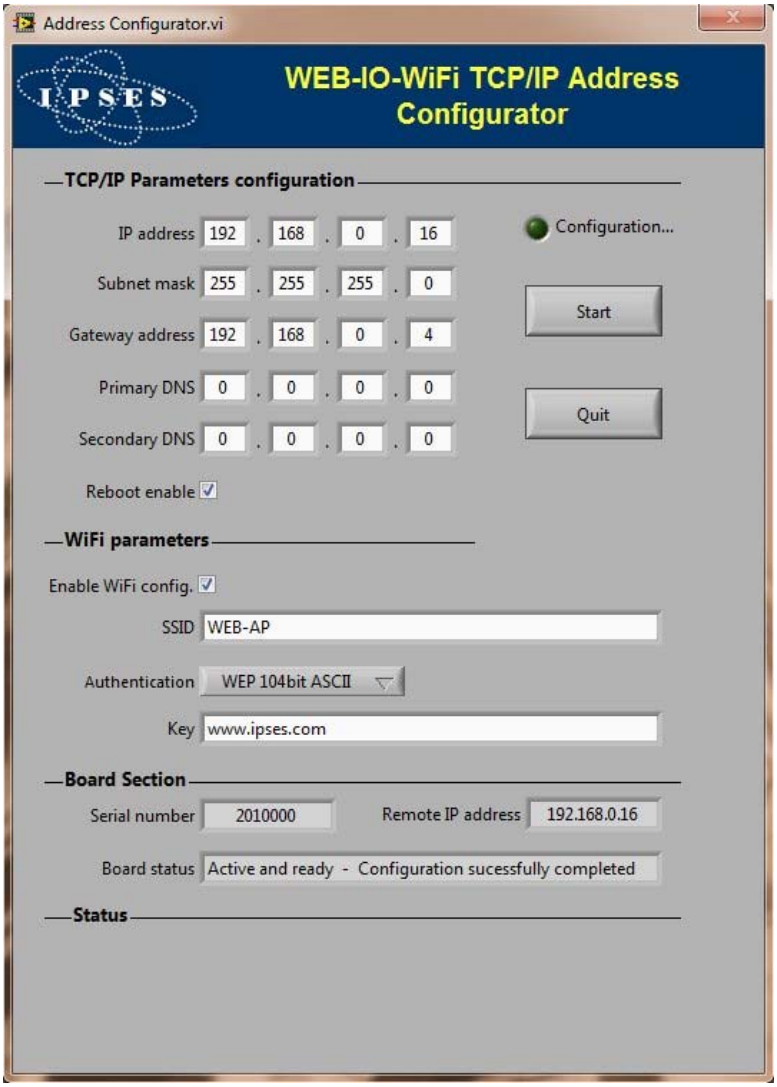


Picture 27: WEB-ADIO-WiFi Address Configurator software control panel

To send the new TCP/IP address and WiFi parameters configuration, click the *Start* button; during the communication with the card the *Configuration* LED is on.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

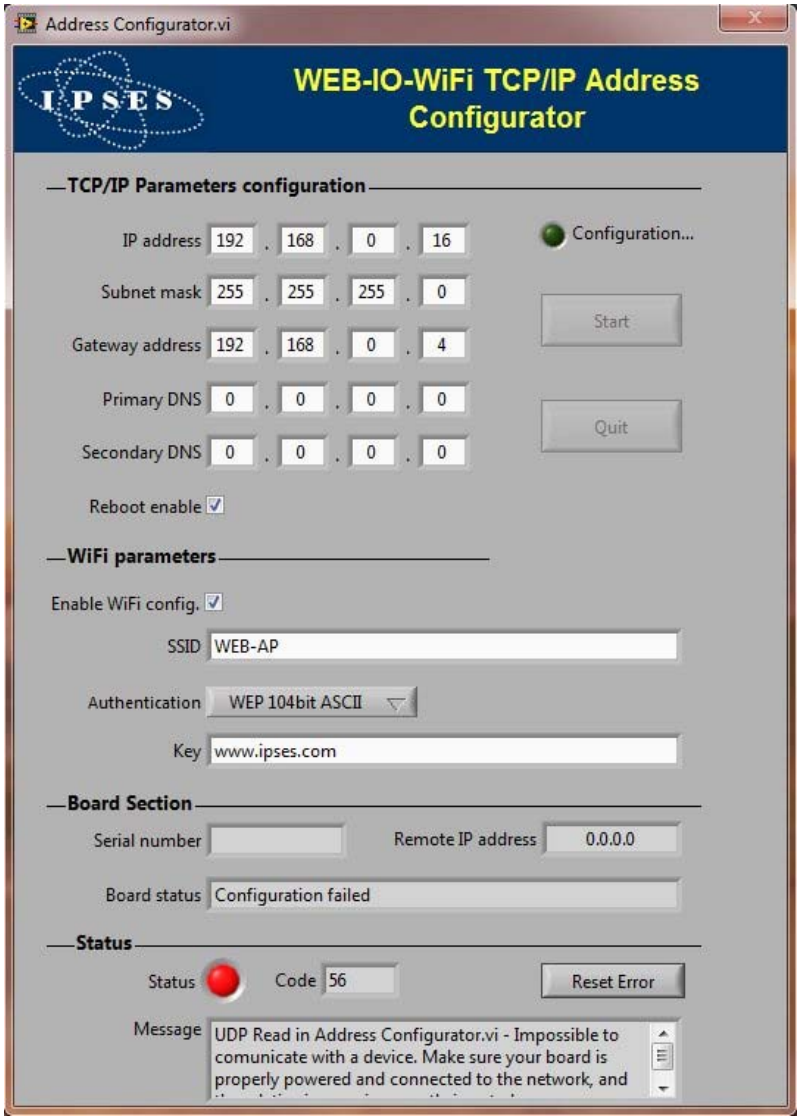
To exit the software, click on *Quit* button.
If the communication handshake to the card has success, the *Serial number* and *Remote IP address* fields in the *Board Section* are filled respectively with the current S/N and IP address of the card, as shown in Picture 28.
The Board status field shows a message about the progress of the configuration status.



Picture 28: Configuration successfully completed.

If a communication error occurs, the *Serial number* field is empty and the *Remote IP address* field shows an invalid IP address (0.0.0.0), while an error message is shown in the *Status* section and the *Start* and *Quit* buttons are disabled until the error is reset, as shown in Picture 29.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com



Picture 29: Error during configuration.

To configure another card, perform the necessary hardware set on the board, then type new addresses and click on the *Start* button.

Note: if you use Windows Vista or Windows 7 on your PC, your operative system could ask you to unlock a firewall restriction when you click on the Start button. Confirm the unlocking of the firewall restriction, otherwise the communication of the software via Ethernet will be interdicted from the operative system.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

PRODUCT CODE

Code	Description
WEB-IO-WiFi	Industrial control board with Ethernet and WiFi interfaces, with 16 digital inputs and 16 digital outputs. Web, telnet and SNMP servers integrated. WiFi antenna integrated.
WEB-IO-WiFi-U.FL	Industrial control board with Ethernet and WiFi interfaces, with 16 digital inputs and 16 digital outputs. Web, telnet and SNMP servers integrated. Ultra miniature coaxial (U.FL) connector for external antenna connection.
WEB-IOLibrary	LabView library (version 8.6 or later) for WEB-IO and WEB-ADIO cards (all models).
Euro-DIN	DIN universal rail for I/O cards (Eurocard format).
ETH-CABLE	Ethernet cable for WEB cards (length: 2,00 m)

TECHNICAL FEATURES

Power supply: external, from 5V to 32V (continuous current)

Maximum current consumption: 250mA @5Vdc, 130mA @12Vdc, 80mA @24Vdc

Working temperature: from 0°C up to +60°C

Storage temperature: from -40°C up to +85°C

Ethernet interface: 1 Ethernet RJ45 port

Wireless interface:

Standard WiFi 802.11b (2,4GHz)
Authentication supported: WEP, WPA(Personal) e WPA2(Personal)
Transmit power: 10dBm (10mW)
Receiver sensitivity: -83dBm
Built-in antenna or *ultra miniature coaxial* (U.FL) connector for external antenna connection
Configurable to connect to any *Access Point*, with any channel and SSID.

Card dimensions: 160 x 100 x 20 mm (6.30 x 3.94 x 0.79 inches)

Inputs:

Digital interface: sixteen optocoupled inputs

Maximum applicable voltage:	36V
Input Impedance:	≈ 2.5Kohm
Logical LOW level:	< 1V
Logical HIGH level:	> 2.5V
Maximum absorbed current:	10mA

Outputs:

Digital interface: eight optocoupled outputs in an open-collector configuration

Maximum output voltage:	36V
Maximum output current:	150mA
Response average time:	100µs

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

Protection:

For the digital interfaces there are optocouplers with 2.500V_{RMS} maximum operative isolation voltage.

Connectors:

Pitch terminal block for all the I/O and power supply connectors.

Supported protocols:

Telnet:	the card can work as a telnet server
HTTP:	the card can work as a web server
SNMP:	the card can work as an SNMP server

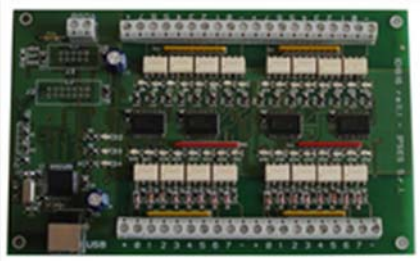
IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

IPSES I/O CARD AVAILABLE MODELS

IO-69: Input/output Card with 6 inputs and 9 relay outputs and USB interface

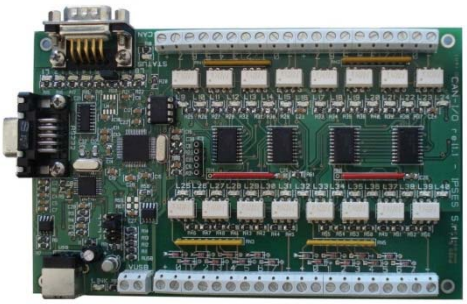
IO-69-USB is a self-powered card to manage six optocoupled inputs and nine relay outputs with USB interface.
A timeout control allows to protect the connecting devices, turning off all the outputs if it does not receive commands from the host within a time configurable through software.
Furthermore, there is the possibility to program all the outputs so that each one will activate only when inputs reach assigned conditions: in this case, IO- 69 acts like a programmable logic controller (PLC).
The card is produced in two versions: with single pole double throw relay (SPDT) and with single pole single throw relay (SPST).

IO-1616: Input/output Card with 16 inputs and 16 outputs and USB or RS232 interface



IO1616 is a self-powered card to manage sixteen optoisolated inputs and sixteen optoisolated outputs with USB interface. The model is available also with RS232 interface, in this case the card needs external power supply.
IO1616 can be directly connected to PLC, to input devices from operator and to other I/O systems. the status of each input
On request, an integrated temperature sensor allows to know in real time the temperature of the system IO1616 is placed in.

CAN-I/O: Input/output Card with 16 inputs and 16 outputs with CAN, USB and RS232 interface



CAN-IO is a control unit equipped with CAN, USB and RS232 interfaces to manage sixteen optocoupled inputs and outputs. The card can work as standalone device on CAN BUS. Its configuration is achieved either through USB (in this case the board is self-powered) or through RS232 interface. Easy to use and to configure, thanks to the provided software, CAN-IO is the right answer to the need to acquire and to drive digital signals through already existing CAN bus.
CAN-IO can be directly connected to PLC, to input devices by operator and to other I/O systems.
Each input and output status can be read by a field bus at any moment. Besides, thanks to LEDs fixed on, the status is shown directly on the board. An integrated temperature sensor allows to know in real time the temperature of the system CAN-IO is placed in.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail
info@ipses.com

WEB-IO: Input/output Card with 16 inputs and 16 outputs, Ethernet interface, integrated web, telnet and SNMP servers and SMTP client.

WEB-IO is a card to manage sixteen optocoupled inputs and sixteen optocoupled outputs with Ethernet interface, equipped with a web, a telnet and an SNMP servers, and an SMTP client. The web server allows to connect and to manage the card using any web browser (i. e. Internet Explorer or Firefox), with no needs to install a software on your PC. Besides, the card can be connected directly to a switch or to a router with no need to use a PC. It is also possible to develop a customized software managed by telnet service or SNMP client. The SMTP client allows to send alert email based on inputs status change events.

WEB-IO can be directly connected to PLC, to input devices from operator and to other I/O systems. Each input and output status can be read by a web browser or a telnet client at any moment, besides it is shown directly on the board thanks to LEDs fixed on. On request, the card can be equipped with an integrated temperature sensor which allows to monitor in real time the temperature around the regulator voltage module. Through expansion connectors the card can be interfaced to a RTCLOG (Real Time Clock and Logger) optional module: by this way, it can perform a log of the I/O states on a dedicated memory.

WEB-IO is available also in box version, it is provided with a demo software for Windows environment, based on telnet service.

WEB-IO-WiFi: Input/output Card with 16 inputs and 16 outputs, Ethernet and WiFi interfaces, integrated web, telnet and SNMP servers

WEB-IO-WiFi is a card to manage sixteen optocoupled inputs and sixteen optocoupled outputs with Ethernet and WiFi interfaces, equipped with a web, a telnet and an SNMP servers. The web server allows to connect and to manage the card using any web browser (i. e. Internet Explorer or Firefox), with no needs to install a software on your PC. Besides, the card can be connected directly to a switch or to a router, by this way it can be accessed by any PC connected to Internet. It is also possible to develop a customized software managed by telnet service or SNMP protocol. The board is available with built-in antenna or with ultra-miniature coaxial (U.FL) connector for external antenna connection.

WEB-IO-WiFi can be directly connected to PLC, to input devices from operator and to other I/O systems. Each input and output status can be read by a web browser or a telnet client at any moment, besides it is shown directly on the board thanks to LEDs fixed on. On request, the card can be equipped with an integrated temperature sensor which allows to monitor in real time the temperature around the regulator voltage module.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail info@ipses.com

WEB-ADIO: Input/output Card with 8 analogical inputs, 8 digital inputs, 8 analogical outputs and 8 digital outputs, Ethernet interface, integrated web, telnet and SNMP servers

WEB-ADIO is a card to manage 8 optocoupled digital inputs, 8 analogical inputs, 8 optocoupled digital outputs and 8 analogical outputs with Ethernet interface, equipped with a web, a telnet and an SNMP servers. The WEB server allows to connect and to manage the card using any web browser (i. e. Internet Explorer and Firefox), with no needs to install a software on your PC Beside, the card can be connected directly to a switch or to a router with no need to use a PC.
It is also possible to develop a customized software managed by telnet service.
WEB-ADIO can be directly connected to PLC or to analogical transducer, to input devices from operator and to other I/O systems.
The analogical inputs and outputs have an operative voltage from 0V to 10V, with a resolution of 10mV and are calibrated one by one. Each input and output status can be read by a web browser or a telnet client at any moment, besides, the status of digital inputs and outputs it is shown directly on the board thanks to LEDs fixed on.

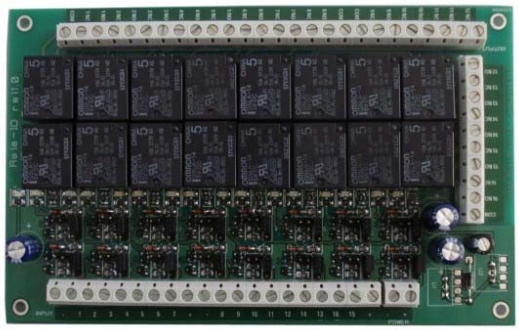
WEB-ADIO-WiFi: Input/output Card with 8 analogical inputs, 8 digital inputs, 8 analogical outputs and 8 digital outputs, Ethernet and WiFi interfaces, integrated web, telnet and SNMP servers

WEB-ADIO-WiFi is a card to manage 8 optocoupled digital inputs, 8 analogical inputs, 8 optocoupled digital outputs and 8 analogical outputs with Ethernet and WiFi interfaces, equipped with a web, a telnet and an SNMP servers. The web server allows to connect and to manage the card using any web browser (i. e. Internet Explorer and Firefox), with no needs to install a software on your PC Beside, the card can be connected directly to a switch or to a router with no need to use a PC. The board is available with built-in antenna or with ultra-miniature coaxial (U.FL) connector for external antenna connection.
It is also possible to develop a customized software managed by telnet service.
The analogical inputs and outputs have an operative voltage from 0V to 10V, with a resolution of 10mV and are calibrated one by one.
WEB-ADIO-WiFi can be directly connected to PLC or to analogical transducer, to input devices from operator and to other I/O systems.
Each input and output status can be read by a WEB browser or a telnet client at any moment, besides, the status of digital inputs and outputs it is shown directly on the board thanks to LEDs fixed on.

.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail info@ipses.com

RELE' I/O: Interface module with16 digital inputs that can control 16 SPDT relay outputs 5A



RELAY I/O(-SEL) is an expansion module with16 digital inputs that can control 16 SPDT relay outputs 5A @ 250VAC or 5A @ 24VDC each

These modules can be used as an expansion for ant I/O card, transforming the TTL or contact freedmen open-collector type outputs (up to a maximum of 16 ones) in 16 relay outputs with NO and/or NC contact.

IPSES provides two board models, based on different relay output tipology:

- RELÈ-IO board: the sixteen outputs are divided in two groups of eight with common COM contact and both NC and NO contacts available on output connectors.
- RELÈ-IO-SEL board: each output is independent and each relay provides COM contact and one contact selectable between NC and NO according dedicated selector configuration.

To operate the cards require an external power supply. Two version are available: RELE'-IO(-SEL)-5 which requires an external power supply of $5V_{dc}$ or RELE'-IO(-SEL)-24 which requires an external power supply from $7V_{DC}$ up to $24V_{DC}$.

The card is in standard Eurocad format (100 x 160 mm - 3,94 x6,30 inches) and can be supplied mounted on opened DIN rail.

N8-USB: *Input Card with 8 inputs and USB interface*

IN8 is a low size auto powered control unit equipped with USB interface. IN8 can check eight galvanic isolated inputs: on each input it is possible to apply voltages regardless form the USB ground, with a maximum voltage of 30V.

Easy to use, thanks to the driver provided with and to the LabVIEW library available on demand, IN8 also reduce installation costs.

The board low size to be easily integrated in several systems. Besides, IN8 has its inputs galvanically isolated to protect from electromagnetic disturbances and ground loops, improving its reliability and quality.

IN8 is the right answer to the need to acquire digital signals from a PC in an industrial environment.

LabVIEW Library for I/O cards:

A complete library for LabVIEW, giving the feasibility of I/O devices remote control, is available on request. The Library allows to implement a LabVIEW application without knowing the details of the communication protocol, making the development quick and easy. Each library is provided with a help file which explains deeper each function included with.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail info@ipses.com

CONTACTS

IPSES S.r.l. conceives, projects and markets electronic and scientific instruments. The customized planning of our devices allows us to answer specific necessities for customers asking for embedded systems. IPSES clients enjoy access to a dedicated project engineering team, available as needed.
Our pool consists of highly competent professionals whose experience in this field is extremely strong. Thanks to constant updating and technical development, IPSES is a leading company, combining the dynamism of a young group into the competence and reliability of a qualified staff.

IPSES S.r.l.

Research and development office:
Via Suor Lazzarotto, 10
20020 Cesate (MI)
Italy

tel. (+39) 02 39449519 - (+39) 02 320629547
fax (+39) 02 700403170
e-mail: info@ipses.com
http://www.ipses.com

SUPPORT INFORMATION

The customer is at liberty to contact the relevant engineer at IPSES S.r.l. directly.

Telephone	:	(+39) 02 39449519
		(+39) 02 320629547
Fax	:	(+39) 02 700403170
Email	:	support@ipses.com

PROBLEM REPORT

The next page is a standard template used for reporting system problems. It can be copied and send as a fax. Alternative bugs may be reported by emails, in this case please insure that the mail contains similar information listed in the *Engineering Problem Report* form.

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail info@ipses.com

ENGINEERING PROBLEM REPORT

Problem describer

Name			**IPSES s.r.l.** **Via Suor Lazzarotto, 10** **Cesate (MI)** **Italy** **Fax (+39) 02 700403170** **e-mail *support@ipses.com***
Company			
Date	Tel.	Fax	

Product

Name	Version	Serial No.

Report Type (bug, change request or technical problem)

Major bug	☐	Urgency:	
Minor bug	☐	High	☐
Change request	☐	Medium	☐
Technical problem	☐	Low	☐

Problem Description

Reproduction of Problem

IPSES s.r.l. Action notes

Received by	Date	Report No.	Action

IPSES S.r.l. Via Suor Lazzarotto, 10 - 20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 Fax (+39) 02 700403170
http://www.ipses.com e-mail info@ipses.com

(Product code WEB-IO-WiFi Rel. 01.00.0002)

IPSES S.r.l.
Via Suor Lazzarotto, 10
20020 Cesate (MI) - ITALY
Tel. (+39) 02 39449519 – (+39) 02 320629547
Fax (+39) 02 700403170
e-mail: info@ipses.com
support@ipses.com